

User Manual



ERM-MUX/Plus

E1 Multi-Service Access Multiplexer

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CTC Union Technologies Co., Ltd.

Far Eastern Vienna Technology Center (Neihu Technology Park)

8F, No. 60, Zhouzi St.

Neihu, Taipei, 114

Taiwan

Phone: +886-2-2659-1021

FAX: +886-2-2799-1355

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ERM-MUX/Plus

This document is the current official release manual. Please check CTC Union's website for any updated manual or contact us by E-mail at info@ctcu.com. Please address any comments for improving this manual or to point out omissions or errors to marketing@ctcu.com. Thank you.

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Chapter 1 Introduction

The ERM-MUX/PLUS Time Division-Multiplexer supports eight E1 channels that provide the functions of multiplexing and cross-connection of data/voice/CAS-signaling. The MUX is designed for multiplexing Nx64Kbps, 64K/128Kbps, 9.6Kbps synchronous data, asynchronous data below 19.2Kbps, G703/64K data and voice signals into 2.048Mbps ITU-T G.703 E1 frames. The cross-connecting function includes the intercrossing of CAS-signaling.

The types and quantity of subscriber's data and voice interface modules can be flexibly selected according to needs. The modules can be plugged into any interface slots according to specific maintenance and application methods. All time slots may be user defined. If more ports are required than are allotted by the main chassis, an extension chassis may be connected later as required.

The ERM-MUX/PLUS supports SNMP (Under development) and/or NMP GUI network management with local PC or via a dedicated timeslot from the E1 line. The NMP GUI can manage more ERM-MUX/PLUS equipment via the E1 network in-line or in nested structures. A console terminal mode is supported as well. When SNMP management mode is available and selected, remote Telnet and HTTP embedded web server are also available for management.

The ERM-MUX/PLUS supports complete redundant functions for the electrical input service, the power module cards, CPU card and E1 card. The E1 backup provides 1+1 modes. All of these cards are capable of automatic switchover in case of failure. The system has complete warning and diagnostic functions for stable and reliable operation.

Power supply options for 110V AC, 220V AC or -48V DC, ensure maximum flexibility for central office installations. This equipment complies fully with all ITU-T standards for E1 transmissions.

1.1 General Features

Structure

19 or 23 inch rack mountable, 4U standard 18-slot chassis, from left to right:

The 1st and 2nd: POWERA slots.

The 3rd and 4th: POWERB slots.

The 5th :CPUA slot.

The 6th :CPUB slot.

The 7th :E1A slot.

The 8th :E1B slot.

The 9th to 18th slots, defined as I/O slot 01 ~ I/O slot

Notice: Each slot has a mark in the front top of the case.

The 10th slot, may be used for plugging in any of the following user data interface modules. The position, type, and number may be selected as required. Any channel of each module can be multiplexed into any one of the eight E1 interfaces, with timeslots configured at user discretion (either in sequence or non-consecutively).

Cable connectors

Front panel

The I/O of each card is accessed from the front panel connectors.

Backplane

Provided with alarm terminals, connects to rack alarm circuits and under failure conditions, alarm signals are sent from shelves/racks.

SNMP

SNMP Gateway interface provides 100Base-TX unshielded twisted pair interface. (Under development)

External Clock

G.703 external clock interface provides two types of interfaces, balanced (RJ-45) and unbalanced (BNC) connectors.

Cascade

RS-485 interface is used for cascading expansion rack, and are provided by RJ-45 x 2 connectors.

DB62 connector for connecting backplane data to expansion rack.

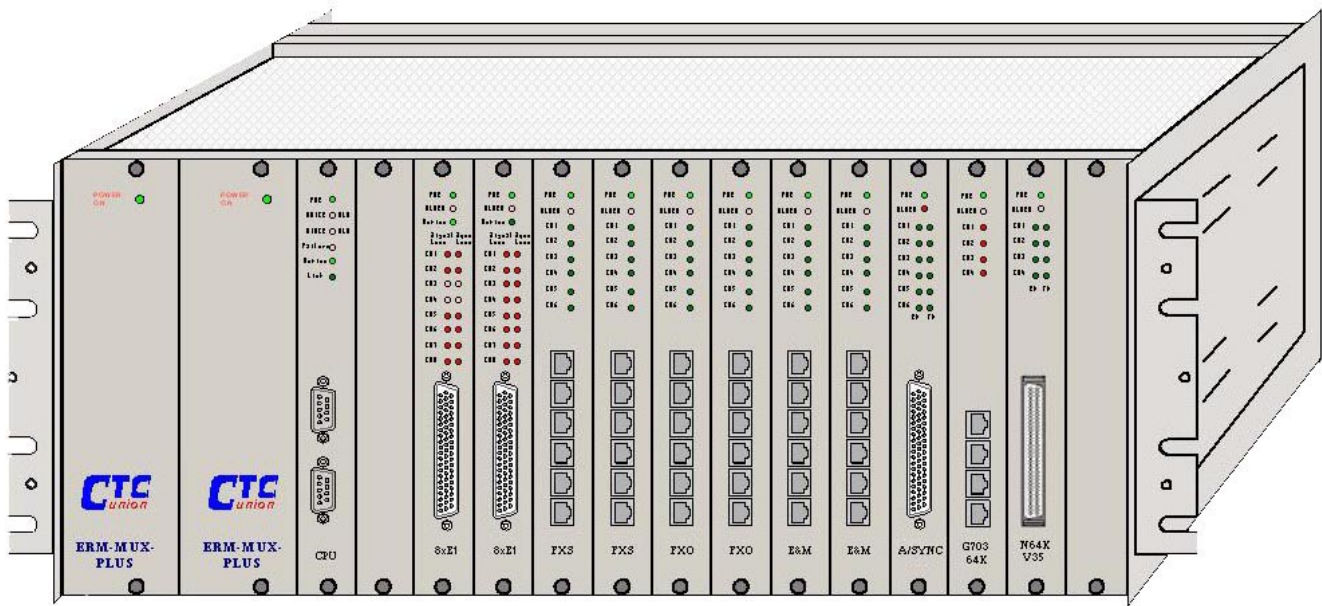


Figure 1.1 ERM-MUX/Plus front panel

1.1.1 Power Supply Modules

POWERA and POWERB slots are used for the power modules. The modules are hot-swappable, capable of automatic switch over in case of module failure, stable, and reliable, with 110VAC, 220VAC or -48VDC options.

1.1.2 CPU Control Card

CPUA and CPUB slots can insert two CPU modules that automatically work in redundant operation mode. CPU modules are responsible for all parameter setup from local PC or from the selected in-band E1 line. The setup of the ERM-MUX/Plus may be accomplished by:

- Local PC connected by Ethernet to SNMP (can be extend to multiple cases with RS485 twisted-pair).
- Local PC connected by serial NMP port to Windows® NMP GUI.
- E1 network connected to SNMP/NMP GUI.
- Local terminal console mode.

1.1.3 E1 Line Card

E1A and E1B slots can insert two E1 line modules that automatically work in redundant operation or separately. Each slot can be selected as 2/4/8 xE1 module. When all E1's are selected as single (1xE1), the 4 E1 channels all support data/voice/CAS signaling cross connection and multiplexing.

Notice : two E1 modules must be configured to single or double E1 mode simultaneously.

1) Combinations:

single module 2/4/8E1 mode

2) Supported frame modes

CAS(PCM30) or CCS(PCM31)

3) Backup mode between E1 modules:

The E1 modules may operate in "working" or "backup" mode and are capable of automatic switchover in case of failure (between E1A and the E1B).

Notice: when configured in "backup" mode, the E1 cables can be randomly connected to the E1A or E1B modules on the front panel.

4) Backup modes between E1 lines:

Card backup:

E1A and E1B1

E1 Line Backup Modes.

E1 module symmetry backup (Double Tx, One Rx to be selected)

For the 8E1 card: E1A1+E1A5/ E1A2+E1A6/ E1A3+E1A7/ E1A4+E1A8;

For the 4E1 card: E1A1+E1A3/ E1A2+E1A4;

For the 2E1 card: E1A1+E1A2

5) System Clock Modes:

- a) E1A1's recovered clock: picked up from the E1A1 receive signal
- b) E1A2's recovered clock: picked up from the E1A2 receive signal (for the 2E1/4E1/8E1 card)
- c) E1A3's recovered clock: picked up from the E1A3 receive signal (for the 4E1/8E1 card)
- d) E1A4's recovered clock: picked up from the E1A4 receive signal (for the 4E1/8E1 card)
- e) E1A5's recovered clock: picked up from the E1A5 receive signal (for the 8E1 card)
- f) E1A6's recovered clock: picked up from the E1A6 receive signal (for the 8E1 card)
- g) E1A7's recovered clock: picked up from the E1A7 receive signal (for the 8E1 card)
- h) E1A8's recovered clock: picked up from the E1A8 receive signal (for the 8E1 card)
- i) Internal crystal clock
- j) G.703 Ext. clock (when this clock is enabled the internal crystal clock will be used for backup).
- k) I/O clock: The timing is locked to the appointed IO Card's CH1 ETC-CLOCK. The I/O modules that support this function are: N64K/V35 module, G703-64K module and A/SYNC-128K module

6) Time slot 0 pass through function (Sa bit 0-4)

7) E1 circuit diagnostic loop back:

- a) Local Loop
- b) To Remote Loop
- c) Bidirectional Loop

8) Performance and BERT test

- a) System supports performance monitoring and BERT test through NMP or Terminal console according RFC 1406 recommendation
- b) System supports CRC-4 and BPV monitoring: CURR ES / UAS , LONG ES / UAS
- c) System supports Loopback test and BERT test: display Rx error amounts, Error counts and Bit-error-rate
- d) System provides test patterns: 2e9-1, 2e11-1 and 2e15-1
- e) System provides Error Insertions and rates: Single, 10e-1, 10e-2, 10e-3, 10e-4, 10e-5, 10e-6, 10e-7.

1.1.4. N64K/V35 Line Card

Each card contains four Nx64K high-speed data interfaces where. N=1 ~ 31 for data rates 64K to 1984Kbps in DCE mode.

1.1.5 A/SYNC-128K Line Card

Each card contains six up to 38.4K data rate for Asynchronous data interfaces, or six 64K/128K sync data interfaces.

1.1.6 G703-64K Line Card

Each card contains four G703-64K Co-directional, contra-directional or centra-directional data interfaces.

1.1.7 FXS Line Card

Each card has 6 FXS ports, for connecting directly to telephone and also with the ability to establish the connection between telephone and FXO card for regular telephone to exchange or direct hot-line (FXS-FXS) applications.

Two modes are provided:

Normal mode: Supports End-to-End of E1 link status monitoring

Backup mode: see Appendix H for further information

1.1.8 FXO Line Card

Each card has 6 FXO ports, for connecting to PBX switchboard. The system manager can create a connection between FXO and FXS card. Caller ID number is supported. The backup function is set by jumpers inside the FXS / FXO card.

Normal mode: Supports End-to-End of E1 link status monitoring

Backup mode: see Appendix H for further information

1.1.9 E&M Line Card

Each card includes 6 E&M ports (Ear and Mouth), offering either 2-wire or 4-wire voice transmission and E&M signaling with TYPE1 to TYPE5.

1.1.10 X.50 Line Card

Each card contains five low-speed Asynchronous/synchronous data interfaces

Data rates:

19.2kbps, 9.6kbps, 4.8kbps or 2.4kbps

Standards compliance:

RS232/V.24

1.1.11 ET100 Ethernet Bridge Line Card

Ethernet Bridge Tributary card provides Ethernet over E1 capability. Incorporating two 10/100Base-TX channels, this transparent bridge supports standard HDLC encapsulation. The WAN data rate depends on the number of E1 timeslots assigned (Nx64).

1.1.12 RS-485/RS-422 Line Card

Asynchronous RS-485/RS-422 Serial Tributary card provides six independent RS-485/RS-232 data channel capability.

Incorporating six separate channels, channels can be independently assigned any Nx64 timeslot from the aggregate E1. Each channel uses a pluggable 4-pin terminal block for connecting one or two twisted pair wires.

1.1.13 SUB-E1 Line Card (Under)

Each card contains two G.703 E1 interfaces. Each SUB-E1 may be multiplexed into any of the E1A1, E1A2, E1B1, or E1B2 interfaces. For special applications requiring the need for Timeslot #0 to be able to transmit the data of CAS signaling, the SUB-E1 supports Timeslot #0 bypass.

1.1.14 Additional Features

Optional expansion chassis for dense data ports application.

All modules are hot-swappable.

Note: The 9th ~ 18th slots are defined as I/O slots, and described logically as slot 01 ~ slot 10. The upper & back panel of I/O slots have been clearly marked on the rack. Any of the logical slots 1 ~ 10 can random insert N64K/V35,A/SYNC-128K, G703-64K, E&M, FXS, FXO, MAGNETO, Sub E1 or Ethernet Bridge I/O line cards.

1.2 Technical Specifications

1.2.1 E1 Line Card

E1 signal structure

Frame format:	CAS(PCM30)/CCS(PCM31), CRC4 ON/OFF
Bit rate:	2.048Mbps
Line codes:	HDB3/AMI
Rx sensitivity:	0 ~ -43dB
Transmission:	1.5km over 0.5mm E1 cable
Line impedance:	75 ohms (unbalanced) / 120ohms (balanced)
Pulse amplitude:	nominal 2.37V (75ohm) / nominal 3.00V (120ohm)
Pulse shape:	ITU-T G.703
Jitter tolerance:	ITU-T G.823 compliant, jitter attenuator included
ITU-T compliance:	G.703, G.704, G.732, G.823.
Internal timing:	2.048MHz +/- 50ppm.
Interface connectors:	BNC (75ohm unbalanced) / RJ-45 (120ohm balanced).

System clock

Internal:	2.048Mbps +/-50ppm;
Recovery:	2.048Mbps +/-50ppm;
G.703 External:	2.048Mbps +/-100ppm

1.2.2 N64/V35 Line Card

Multiplexes Nx64K data onto any E1 and any timeslot.

Data speed: Nx64K(N=1 to 30, or 31).
Data access: RS-530, RS-449, V.35, X.21, equipped with corresponding interface cable.
Access mode: DCE
Software setting: Interface /Local /To Remote /Bidirectional Loop

1.2.3 A/SYNC-128K Line Card

Data speed: ≤38.4kbps async or 64kbps/128kbps sync.
Data access: V.24(RS-232).
access mode: DCE
Software setting: Interface /Local /To Remote /Bidirectional Loop

1.2.4 G703-64K Line Card

Access mode: G.703-64Kbps co-directional /contra-directional / centra mode.
Speed: 64Kbps+/-100ppm.
Line: 0.5~0.7mm twisted-pair, 4 Wire.
Transmission distance: 600m or less (0.5~0.7mm twisted-pair) .
Impedance: balanced 120ohm.
Standard: according to ITU-T G.703 and G.823.
Frame format: unframed.
Line coding: accord with ITU-T G.703 64K, co-directional /contra-directional / centra coding.
Pulse Shape: accord with ITU-T G.703, 64K
Software setting: Interface /Local /To Remote /Bidirectional Loop

1.2.5 E&M Line Card

E&M Signaling technical specifications

E&M lines: E line, M line, SB (battery) and SG (ground) lines.
Loop current: 5~30 mA, maximum 70 mA.
E&M Signaling: TYPE1-TYPE5 mode independently per port. (see section 4.3 Voice Transmission technical index)
LEDs: E&M signaling status: active status or idle status.
Audio line Impedance: 600 ohm.
Voice attenuation: set independently, in 0.5dB steps. (see section 4.3)
Wire mode: set independently as 2W or 4W by the switch (see section 4.3)
Software setting: Interface /Local /To Remote /Bidirectional Loop

1.2.6 FXO Line Card

PBX side exterior line (FXO) technical specifications:

Line Impedance: 600 ohm.
On-hook resistance: greater than 100kohm
Of-hook resistance: less than 300ohm
DC voltage maximum: more than 70V
DC current maximum: more than 150mA
Software setting: Interface /Local /To Remote /Bidirectional Loop
Supports Caller ID display

1.2.7 FXS Line Card

Telephone exterior line (FXS) technical specifications:

Line Impedance: 600 ohm.
Ring output: 75+/-15VAC, frequency 25+/-3Hz, harmonic distortion less than 10% sine signal.
300mA load output voltage virtual value larger than 50V.
Feed-in Voltage: -48V, allow maximum loop resistance 1800ohm (include inside resistance of phone 300ohm),
current of phone greater than 18mA
Off-hook: check point is 10+/-3mA.
Feed-in loop current: 18 ~ 50mA.

Long distance access lightning strike static protection characteristic:

Endure 1000V peak voltage between TIP line RING line and ground line, pulse width 10 μ s, half of peak time, 700 μ s without any damage.

1.2.8 ET100 Ethernet Bridge Line Card

Two independent Ethernet over E1 channels:

Connector:	RJ-45
Data rate/Duplex:	10/100Mbps, full/half duplex.
Standards:	IEEE 802.3, IEEE802.3u, IEEE802.3X
MDI/MDIX:	Auto
Filtering	256 MAC address table
Buffer	340 Packets
Encapsulation	HDLC
Packet sizes	64 bytes to 1522 bytes

1.2.9 RS-485/RS-422 Serial Tributary Card

Six Independent Asynchronous RS-485/RS-422 data channels:

Interface:	RS-422 4 wires, RS-485 4/2 wires
Baud rate:	Async mode $\leq 128K$
Bit Error Rate	Less than 10^{-10}
Connector:	4-pin terminal block x 6
Duplex	Full/Half

1.2.10 X.50 Module Line Card

Multiplexes low-speed data onto a single 64Kbps timeslot.

Standard compliance:	ITU-T X.50 Division 3, with 6+2 packetization.
Data rates:	Sync / Async $\leq 19.2K$.
Data interface:	V.24 (RS-232)

1.2.11 SUB-E1 Line Card (Under Development)

Specification: same as E1 module

Description:

SUB-E1 Line Card supports Timeslot #0 bypass when USER needs to transmit data with Sa4-Sa8 in Timeslot #0.

NOTE: when enabling Timeslot #0 By-Pass, No CRC4 will pass thru Timeslot #0 (see reference 5.3.9.2)

1.2.12 Power Modules

Input:	110VAC $\pm$ 15%, 220VAC $\pm$ 15% or -48VDC (-40V to -57V)
Power consumption:	approximately 60W

1.2.13 Physical Specifications

Dimensions:	437 x 176 x 290 (Width x Height x Depth mm)
Weight:	~8 kg (including dual power & 8 I/O cards)
Working environment:	Temperature: 0°C ~ 50°C Humidity: 0 ~ 95%

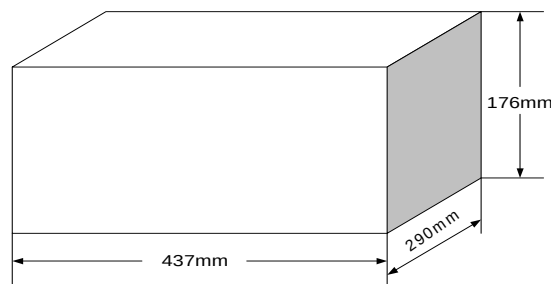


Figure 1.2 ERM-MUX/Plus Physical Dimensions

Chapter 2 Installation

This chapter will explain the installation procedures for the ERM-MUX/Plus E1 Access Multiplexer.

Fig. 2.1 shows the external view of ERM-MUX/PLUS.

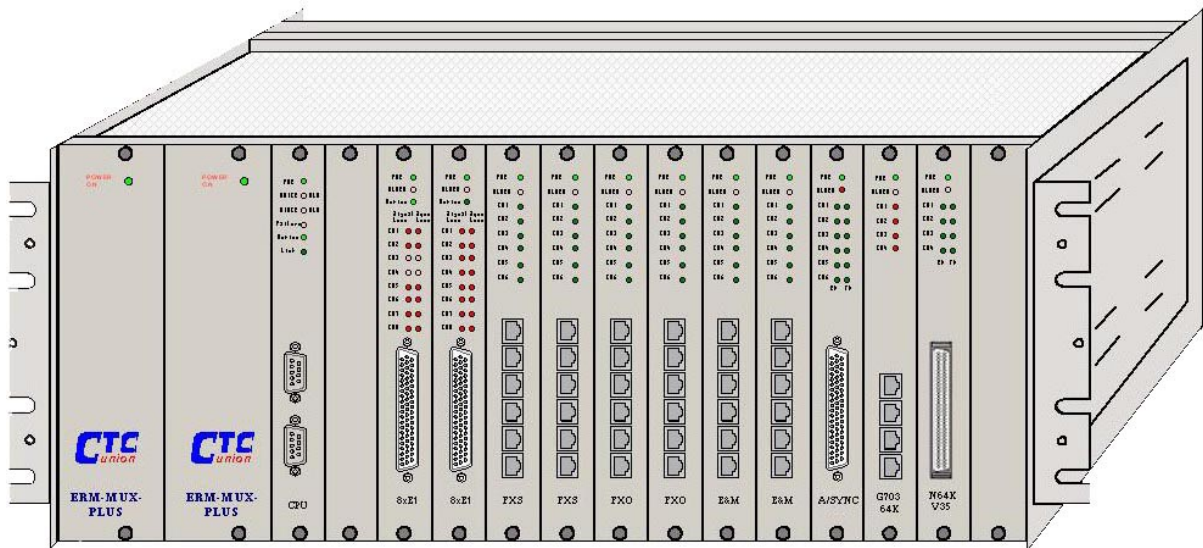


Fig 2.1 ERM-MUX/PLUS appearance

2.1 Installing Brackets on Chassis

By adjusting the position of the brackets on both sides of the chassis, the chassis can be mounted on either 19" or 23" rack or shelf. The supporting bracket could be either on the front or in the middle part of the rack's side, as shown in Fig.2.2 view from above.

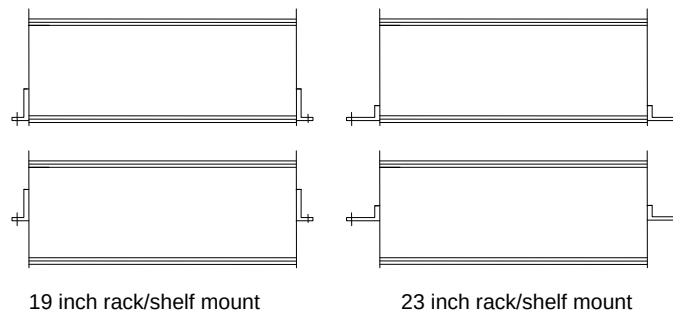


Fig 2.2 Installing supporting brackets (top view)

2.2 Power Modules and Line Card Installation

Power slots: POWERA and POWERB are for power modules. Both power modules work in hot standby mode, capable of automatic switchover if one module fails.

* **CPU slots:** CPUA/CPUB are for CPU Cards. Both CPU Cards work with one active and one in hot standby mode, capable of automatic switchover if one card fails.

* **E1 slots:** E1A/E1B are for E1 Line Cards. Both E1 Cards work with one active and one in hot standby mode, capable of automatic switchover if one card fails.

* **IO slots:** IO slot 01 to IO slot 10 may be optionally used for N64K/V35, A/SYNC-128K, G703-64K, E&M, FXS, FXO and Magneto line cards. Their position, type and quantity of line cards may be determined according to customer needs. Any channel of each module may be multiplexed onto any one of the two or four E1 lines, with timeslots configured at discretion (either in sequence or in random order).

Note: slot positions have been defined by marks on the top of the rack

2.2.1 Cable connectors

Front

All IO cable connections are located on front panel of IO line cards. Cables of each card extend from the front panel connectors. Please reserve enough space in the front of the chassis to extend these cables.

Back

Located on the rear of the chassis are the alarm terminals relay contacts, that connect to rack alarm circuits. Under failure conditions, alarm signals are sent from the shelves/racks.

* **SNMP Port** interface provides a 10/100Base-TX twisted pair Ethernet interface. (under development)

* **G.703 ext. clock** interface provides two types of interfaces, balanced (RJ-45) and unbalanced (BNC) connectors.

* **RS-485 interface:** for connecting expansion chassis control signals via RJ-45 x 2 connectors.

* **HDB 62 interface:** for connecting the expansion chassis bus.

2.3 Auxiliary Connections on Rear of Chassis

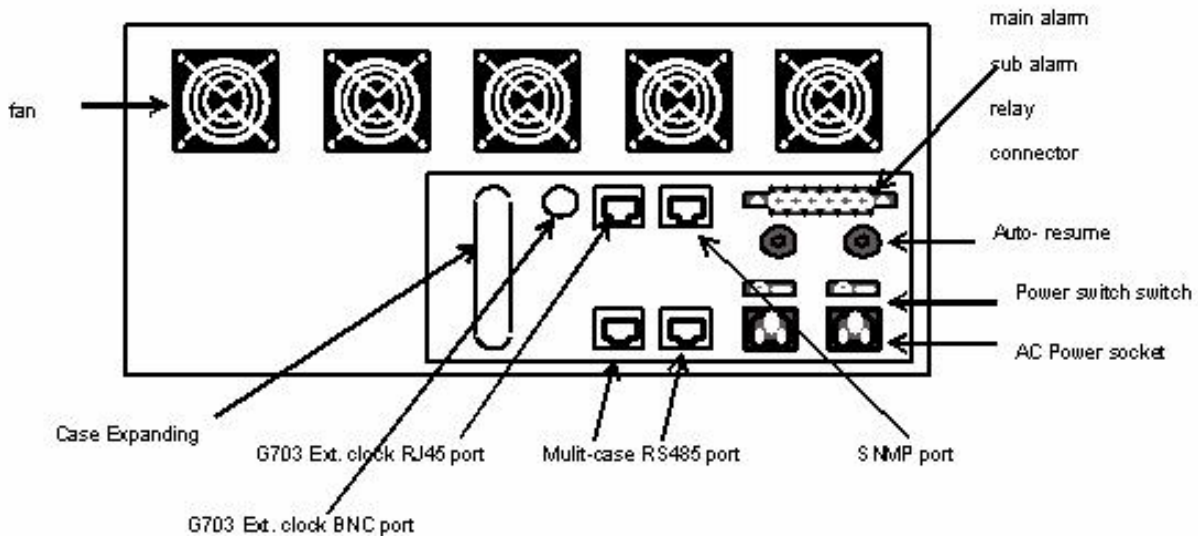


Fig 2.3 ERM-MUX/PLUS Backplane (2 x AC POWER shown)

2.4 Connecting Power Supplies

User can select 110VAC, 220VAC or DC power modules. AC and DC backplane are different. AC+AC model is shown in figure 2.3.

The connector for alarm relays can be connected to the existing alarm system. When the Major Alarm (such as power failure) or Minor Alarm (such as fans failure) occurs, the alarm relays can conduct signal to the whole alarm system.

Alarm Connectors Definition: Major Alarm and Minor Alarm.

Relay Connectors Definition: COM = common, NO = normally open, and NC = normally closed.

Major Alarm	E1 modules	alarm
		normal
	CPU modules	alarm
		normal
Minor Alarm	Power modules	alarm
		normal
	fan alarm	alarm
		normal
	I/O modules	alarm
		normal
	G703 Ext clock	Ext clock port Signal Loss
		Ext clock port Signal Normal

Table 2.1 Major Alarm and Minor Alarm content.

2.5 Connecting SNMP Network Management Access

Connect RJ45 cable between Hub/PC to SNMP port on the rear panel of ERM-MUX/PLUS.

SNMP port is auto MDIX, so straight cable for the connection should be ok.

The pin assignment of SNMP port is Pin 1,2→TD, Pin 3,6→RD.

Use Multi-case RS485 control ports for chassis cascade (see fig 2.4)

RJ45 pin assignment: Pin 4(+), Pin 5(+) TX/RX, Pin7, 8 are for grounding.

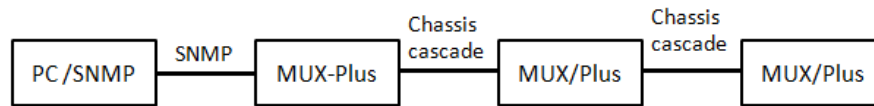


Fig 2.4

2.6 Connecting NMP Network Management Access

NMP network manage can connect via local PC or be cascaded via E1 from other ERM-MUX/PLUS. The mode is called In-band network management mode. (See the Network Device Management and Operation User Manual)

Note: Before using NMP network functions, configure with console terminal menu to select the network management mode and other necessary settings. (See Chapter 5.)

Local NMP network management

Connect DB9 cable between PC and CPU module front panel NM Ctrl connector (see fig 2.5)

Communication settings:

Interface:	RS-232
Speed:	9600bps/
Parity:	N
Bits:	8
Stop bits:	1

Notes:

- 1) When using double CPU cards and after the power is turned on, the CPU cards will work in Backup Mode automatically, without any need for special setting.
- 2) The PC to CPU RS-232 cable to front panel should be connected to the Working CPU card.

In-band NMP network management

After setting from the console terminal menu, the E1 from E1A1 line may be cascaded from other superior device (NMP only uses one time slot of an E1 line). Refer to fig 2.5.

Note: Only E1A1 line or its backup E1 line can connect using the in-band NMP network management.

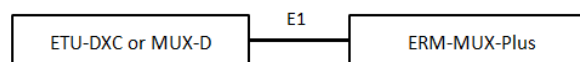


Fig 2.5

2.7 Connecting Monitor/Control Terminal

Connect a DB9 to DB9 cable between the PC COM port and CPU card's front panel LOC Ctrl connector.
Connect a crossover or null-modem DB9 to DB9 cable between the modem and CPU card's front panel LOC Ctrl connector.

Communication settings:

- Interface: RS-232
- Speed: 9600bps/
- Parity: N
- Bits: 8
- Stop bits: 1

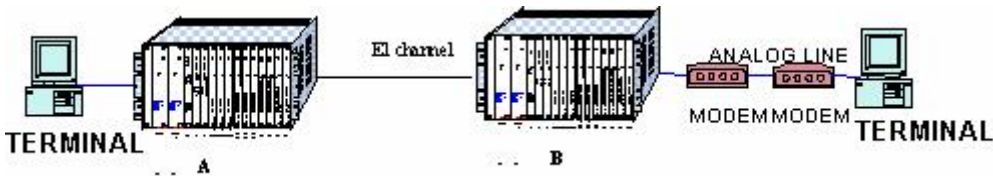


Fig. 2.6 Local and remote management terminal connections

2.8 Connecting G.703 External Clock

Unbalance BNC connector on backplane (EXT CLK)
Balanced RJ-45 connector on backplane (EXT CLK), Pin assignments: Pin 4,5 Receive, 7,8 Ground.

2.9 Connecting E1 Circuits

Connect a DB37 to Unbalance (75ohm) BNC or Balanced (120ohm) RJ-45 connectors cable to the DB37 provided on the front panel of the E1 card.
The RJ-45 follows USOC RJ-48C standard: Pin1,2 Receive, 4,5 Send, 7,8 Ground.

- Note:
- 1) When using E1 Backup mode, the E1 cable can randomly connect to either E1A or E1B card on the front panel.
 - 2) When using a single E1, use the E1A slot card.

2.10 Connecting I/O Cards

For details of all the different IO cards and their connections from front panel with different cables, see chapter 3.
The IO cards all have DCE interface. To emulate DTE you must use crossover cables. For DTE crossed cable connection methods see fig 2.5 fig 2.9 fig 2.6.

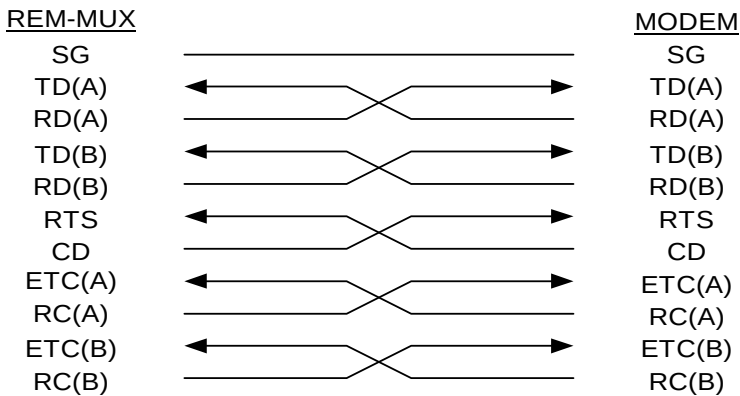


Fig2.5 V.35 cross cable

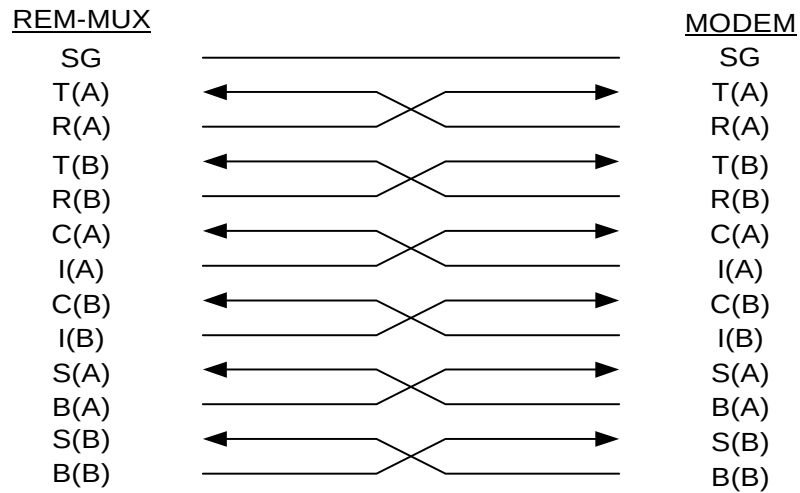
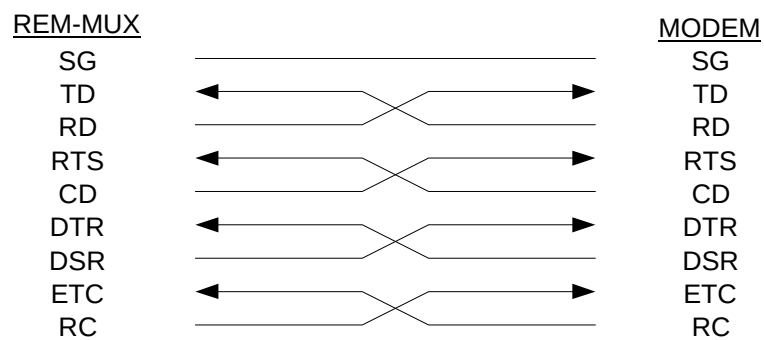


Fig 2.6 X.21 cross cable

2.11 Connecting Sync Tail Circuits



Note :no DTR, DSR, ETC, RC in ASYNC

Fig 2.7 RS-232 cross cable

The E1 clock of MUX/PLUS A is configured as master clock, while that of MUX/PLUS B is configured as slave clock. The Tx clock of MODEM B is configured as loop clock. MODEM A and MUX/PLUS B (both DCE) are connected with crossover interface cables. All terminal interface cables are straight through cables.

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Chapter 3 LED Indicators and Cable Pin Definitions

Chapter 3 LED Indicators and Cable Pin Definitions

3.1 Front panel LED indicators

LED names	Color	Descriptions
POWER Card	green	when lit indicates power is normal, when off - power failure
CPU Card: PWR Major Alarm Minor Alarm Failure Active Link	green red red red green yellow	when lit indicates Card power normal, when off - Card power fault when lit indicates major alarm when lit indicates minor alarm when lit indicates configuration failure. when off - normal when lit indicates working. when off -standby when lit indicates SNMP PORT LINK, when off - NO LINK
E1 card: PWR Alarm Active Ch1 SYNC Signal Loss Loss Ch2 SYNC Signal Loss Loss Ch3 SYNC Signal Loss Loss Ch4 SYNC Signal Loss Loss Ch5 SYNC Signal Loss Loss Ch6 SYNC Signal Loss Loss Ch7 SYNC Signal Loss Loss Ch8 SYNC Signal Loss Loss	green red green red red red red red red red red red red red red red red red red red red red red	when lit indicates Card power normal, when off - Card power fault when lit indicates Card alarm, when off - normal when lit indicates working, when off -standby when lit indicates SYNC Loss/ Signal Loss, when off - normal when lit indicates SYNC Loss/ Signal Loss, when off - normal when lit indicates SYNC Loss/ Signal Loss, when off - normal when lit indicates SYNC Loss/ Signal Loss, when off - normal when lit indicates SYNC Loss/ Signal Loss, when off - normal when lit indicates SYNC Loss/ Signal Loss, when off - normal when lit indicates SYNC Loss/ Signal Loss, when off - normal when lit indicates SYNC Loss/ Signal Loss, when off - normal when lit indicates SYNC Loss/ Signal Loss, when off - normal when lit indicates SYNC Loss/ Signal Loss, when off - normal
G703/64K Card: PWR Alarm Ch1 Ch2 Ch3 Ch4	green red red red red red	when lit indicates Card power normal, when off - Card power fault when lit indicates Card alarm, when off - normal when lit indicates Signal Loss, when off - normal (CH1) when lit indicates Signal Loss, when off - normal (CH2) when lit indicates Signal Loss, when off - normal (CH3) when lit indicates Signal Loss, when off - normal (CH4)
N64K Card (V.35 and RS232) : PWR Alarm Ch1 RD TD Ch2 RD TD Ch3 RD TD Ch4 RD TD	green red green green green green green green green green	when lit indicates Card power normal, when off - Card power fault when lit indicates Card alarm, when off – normal lit when data is transmitted/ received lit when data is transmitted/ received lit when data is transmitted/ received lit when data is transmitted/ received
A/SYNC 128 Card: PWR Alarm Ch1 RD TD Ch2 RD TD Ch3 RD TD Ch4 RD TD Ch5 RD TD Ch6 RD TD	green red green green green green green green green green green green green green	when lit indicates Card power normal, when off - Card power fault when lit indicates Card alarm, when off – normal lit when data is transmitted/ received lit when data is transmitted/ received lit when data is transmitted/ received lit when data is transmitted/ received lit when data is transmitted/ received lit when data is transmitted/ received

Chapter 3 LED Indicators and Cable Pin Definitions

LED names	Color	Signaling mode	No Signaling mode
E&M Card:			
PWR	green	when lit indicates Card power normal, when off - power fault	when lit indicates Card power normal, when off - power fault
Alarm	red	when lit indicates Card alarm, when off - normal	when lit indicates Card alarm, when off - normal
Ch1	green	lit when Signaling is active	lit when data is transmitted/ received
Ch2	green	lit when Signaling is active	lit when data is transmitted/ received
Ch3	green	lit when Signaling is active	lit when data is transmitted/ received
Ch4	green	lit when Signaling is active	lit when data is transmitted/ received
Ch5	green	lit when Signaling is active	lit when data is transmitted/ received
Ch6	green	lit when Signaling is active	lit when data is transmitted/ received

LED names	Color	Descriptions
FXS Card:		
PWR	green	when lit indicates Card power normal, when off - power fault
Alarm	red	when lit indicates Card alarm, when off - normal
Ch1	green	lit when Signaling is active
Ch2	green	lit when Signaling is active
Ch3	green	lit when Signaling is active
Ch4	green	lit when Signaling is active
Ch5	green	lit when Signaling is active
Ch6	green	lit when Signaling is active
FXO Card:		
PWR	green	when lit indicates Card power normal, when off - power fault
Alarm	red	when lit indicates Card alarm, when off - normal
Ch1	green	lit when Signaling is active
Ch2	green	lit when Signaling is active
Ch3	green	lit when Signaling is active
Ch4	green	lit when Signaling is active
Ch5	green	lit when Signaling is active
Ch6	green	lit when Signaling is active
MAGNETO Card		
PWR	green	when lit indicates Card power normal, when off - power fault
Alarm	red	when lit indicates Card alarm, when off - normal
Ch1	green	lit when Signaling is active
Ch2	green	lit when Signaling is active
Ch3	green	lit when Signaling is active
Ch4	green	lit when Signaling is active
Ch5	green	lit when Signaling is active
Ch6	green	lit when Signaling is active

Chapter 3 LED Indicators and Cable Pin Definitions

3.2 Interface Connector Pins and Definitions

3.2.1 8xE1-BNC Cable Pins

DB37(M)	BNC (F)	Channel	Function
20	TTIP BNC core +	CH1 TX	TX1
2	TRING BNC Shield -		
21	RTIP BNC core +	CH1 RX	RX1
3	RRING BNC Shield -		
22	TTIP BNC core +	CH2TX	TX2
4	TRING BNC Shield -		
23	RTIP BNC core +	CH2 RX	RX2
5	RRING BNC Shield -		
6	TTIP BNC core +	CH3 TX	TX3
25	TRING BNC Shield -		
7	RTIP BNC core +	CH3 RX	RX3
26	RRING BNC Shield -		
8	TTIP BNC core +	CH4 TX	TX4
27	TRING BNC Shield -		
9	RTIP BNC core +	CH4 RX	RX4
28	RRING BNC Shield -		
29	TTIP BNC core +	CH5 TX	TX5
11	TRING BNC Shield -		
30	RTIP BNC core +	CH5 RX	RX5
12	RRING BNC Shield -		
31	TTIP BNC core +	CH6 TX	TX6
13	TRING BNC Shield -		
32	RTIP BNC core +	CH6 RX	RX6
14	RRING BNC Shield -		
15	TTIP BNC core +	CH7 TX	TX7
34	TRING BNC Shield -		
16	RTIP BNC core +	CH7 RX	RX7
35	RRING BNC Shield -		
17	TTIP BNC core +	CH8 TX	TX8
36	TRING BNC Shield -		
18	RTIP BNC core +	CH8 RX	RX8
37	RRING BNC Shield -		

Chapter 3 LED Indicators and Cable Pin Definitions

3.2.2 n64K(V.35) Card

ERM-MUX-PLUS N*64K V.35 Cable

68Pin Male Pin				V.35 Pin	Function
Channel 1	Channel 2	Channel 3	Channel 4		
Shield	Shield	Shield	Shield	A, Shield	PG
17	18	51	52	B	SG
1	19	35	53	R	RD(A)
2	20	36	54	T	RD(B)
3	21	37	55	V	RC(A)
4	22	38	56	X	RC(B)
5	23	39	57	Y	TC(A)
6	24	40	58	AA	TC(B)
7	25	41	59	P	TD(A)
8	26	42	60	S	TD(B)
9	27	43	61	U	ETC(A)
10	28	44	62	W	ETC(B)
11	29	45	63	H	DTR
15	33	49	67	C	RTS
13	31	47	65	F	DCD
				D	CTS
				E	DSR

XX(A) and XX(B) must be twisted wire pair.

Note : V35PIN -F , D , E shorted.

ERM-MUX-PLUS N*64K RS-232 Cable

68Pin Male Pin				RS-232 DB25 Pin	Function
Channel 1	Channel 2	Channel 3	Channel 4		
Shield	Shield	Shield	Shield	1,Shield	PG
17	18	51	52	7	SG
1	19	35	53	3	RD
2	20	36	54		
3	21	37	55	17	RC
4	22	38	56		
5	23	39	57	15	TC
6	24	40	58		
7	25	41	59	2	TD
8	26	42	60		
9	27	43	61	24	ETC
10	28	44	62		
11	29	45	63	5	CTS
12	30	46	64	6	DSR
13	31	47	65	8	DCD
14	32	48	66		
15	33	49	67	4	RTS
16	34	50	68	20	DTR

Chapter 3 LED Indicators and Cable Pin Definitions

ERM-MUX-PLUS N*64K RS-530 Cable

68Pin Male Pin				RS-530 DB25 Pin	Function
Channel 1	Channel 2	Channel 3	Channel 4		
Shield	Shield	Shield	Shield	1,Shield	PG
17	18	51	52	7	SG
1	19	35	53	3	RD(A)
2	20	36	54	16	RD(B)
3	21	37	55	17	RC(A)
4	22	38	56	9	RC(B)
5	23	39	57	15	TC(A)
6	24	40	58	12	TC(B)
7	25	41	59	2	TD(A)
8	26	42	60	14	TD(B)
9	27	43	61	24	ETC(A)
10	28	44	62	11	ETC(B)
11	29	45	63	20	DTR(A)
12	30	46	64	23	DTR(B)
13	31	47	65	8	DCD(A)
14	32	48	66	10	DCD(B)
15	33	49	67	4	RTS(A)
16	34	50	68	19	RTS(B)
				5	CTS(A)
				13	CTS(B)
				6	DSR(A)
				22	DSR(B)

XX(A) and XX(B) must be twisted wire pair.

Note : DB25 PIN: 8, 5, 6 shorted. 10, 13, 22 shorted

ERM-MUX-PLUS N*64K X.21 Cable

68Pin Male Pin				X.21 DB15 Pin	Function
Channel 1	Channel 2	Channel 3	Channel 4		
Shield	Shield	Shield	Shield	1,Shield	PG
17	18	51	52	8	SG
1	19	35	53	4	R(A)
2	20	36	54	11	R(B)
3	21	37	55	6	S(A)
4	22	38	56	13	S(B)
5	23	39	57		
6	24	40	58		
7	25	41	59	2	T(A)
8	26	42	60	9	T(B)
9	27	43	61		
10	28	44	62		
11	29	45	63		
12	30	46	64		
13	31	47	65	5	I(A)
14	32	48	66	12	I(B)
15	33	49	67	3	C(A)
16	34	50	68	10	C(B)

XX(A) and XX(B) must be twisted wire pair.

Chapter 3 LED Indicators and Cable Pin Definitions

ERM-MUX-PLUS N*64K RS-449 Cable

68Pin Male Pin				RS-449 DB37 Pin	Function
Channel 1	Channel 2	Channel 3	Channel 4		
Shield	Shield	Shield	Shield	1,Shield	PG
17	18	51	52	19-20-37	SG-RC-SC
1	19	35	53	6	RD(A)
2	20	36	54	24	RD(B)
3	21	37	55	8	RC(A)
4	22	38	56	26	RC(B)
5	23	39	57	5	TC(A)
6	24	40	58	23	TC(B)
7	25	41	59	4	TD(A)
8	26	42	60	22	TD(B)
9	27	43	61	17	ETC(A)
10	28	44	62	35	ETC(B)
11	29	45	63	12	DTR(A)
12	30	46	64	30	DTR(B)
13	31	47	65	13	DCD(A)
14	32	48	66	31	DCD(B)
15	33	49	67	7	RTS(A)
16	34	50	68	25	RTS(B)
				11	DSR(A)
				29	DSR(B))
				9	CTS(A)
				27	CTS(B)

XX(A) and XX(B) must be twisted wire pair.

Note: DB37 PIN:13, 11, 9 shorted. 31, 29, 27 shorted

Chapter 3 LED Indicators and Cable Pin Definitions

3.2.3 A/SYNC 128 Card

ERM-MUX/PLUS A/SYNC 128 RS232 Cable

HDB62 (M)	DB25/F (1)	Function
44	2	TD
22	3	RD
1	4	RTS
3	5	CTS
	6	DSR (107)
43	7	GND
46	8	CD
2	15	TC
45	17	RC
24	20	DTR (108)
23	24	ETC
	DB25/F (2)	
47	2	TD
5	3	RD
25	4	RTS
27	5	CTS
	6	DSR
4	7	GND
49	8	CD
26	15	TC
48	17	RC
7	20	DTR
6	24	ETC
	DB25/F (3)	
50	2	TD
29	3	RD
8	4	RTS
10	5	CTS
	6	DSR
11	7	GND
52	8	CD
9	15	TC
51	17	RC
31	20	DTR
30	24	ETC
	DB25/F (4)	
53	2	TD
12	3	RD
32	4	RTS
34	5	CTS
	6	DSR
35	7	GND
55	8	CD
33	15	TC
54	17	RC
14	20	DTR
13	24	ETC

Chapter 3 LED Indicators and Cable Pin Definitions

ERM-MUX/PLUS A/SYNC 128 RS232 Cable (cont.)

HDB62 (M)	DB25/F (5)	
56	2	TD
36	3	RD
15	4	RTS
17	5	CTS
	6	DSR
18	7	GND
58	8	CD
16	15	TC
57	17	RC
38	20	DTR
37	24	ETC
	DB25/F (6)	
59	2	TD
19	3	RD
39	4	RTS
41	5	CTS
	6	DSR
42	7	GND
61	8	CD
40	15	TC
60	17	RC
21	20	DTR
20	24	ETC

3.2.4 G703/64K Card

ERM-MUX/PLUS G703/64K Cable

RJ-45	Function
1	RTIP
2	RRING
3	TTIP
4	TRING
7	GND
8	GND

3.2.5 E&M Card

ERM-MUX/PLUS E&M Cable

RJ-45	Definition
1	4W (send) /2W LINE A
2	4W (send) /2W LINE B
3	4W (receive) /2W LINE A
4	4W (receive) /2W LINE B
5	E-LINE(Signaling)
6	M-LINE(Signaling)
7	SG
8	SB

Chapter 3 LED Indicators and Cable Pin Definitions

3.2.6 FXS Card

ERM-MUX-PLUS FXS Cable

RJ45(LINK TO MUXPLUS)	RJ11(LINK TO PHONE)	FUNCTION
4	2	2W LINE-A
5	3	2W LINE-B

3.2.7 FXO Card

ERM-MUX-PLUS FXO Cable

RJ45(LINK TO MUXPLUS)	RJ11(LINK TO EXCHANGE)	FUNCTION
4	2	2W LINE-A
5	3	2W LINE-B

3.2.8 RS485/422 Pin Assignment

ERM-MUX-PLUSRS485/422 Port

4 wires	Function
1	RX(+)
2	RX(-)
3	TX(+)
4	TX(-)

2 wires	Function
1	(+)
2	(-)

Chapter 3 LED Indicators and Cable Pin Definitions

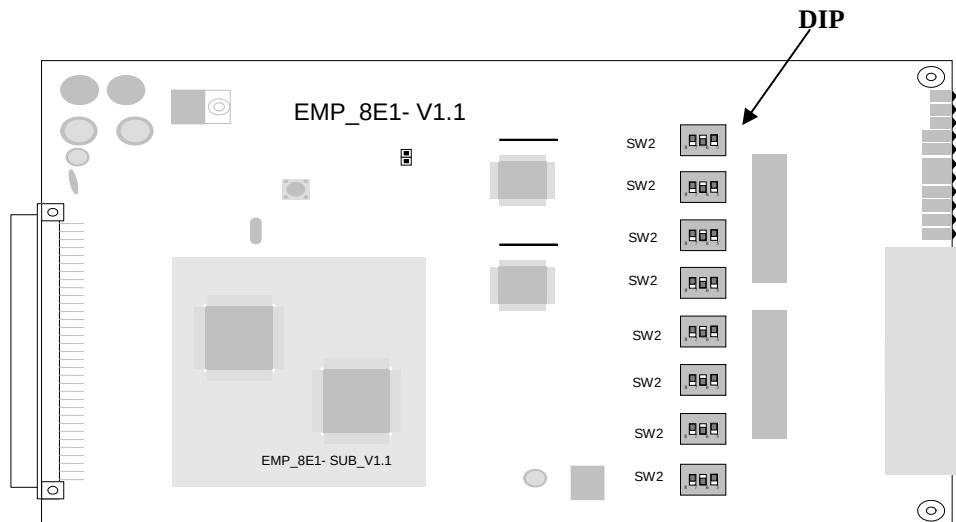
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Chapter 4 Hardware Settings

When setting the ERM-MUX/PLUS via NMP management system or Terminal console process, the setting parameters are stored in non-volatile RAM. In addition to the soft settings, some PCB cards require some settings of DIP switches or jumpers.

4.1 E1 Card

SW2: All "ON" places E1 card interface impedance at 75 ohm for BNC.
All "OFF" places E1 card interface impedance at 120 ohm for RJ-45



4.1 E1 Card

4.2 N64K/V35 Card

Interface selection

CH1 Jumper: SW7, SW15, SW3, SW11, SW19

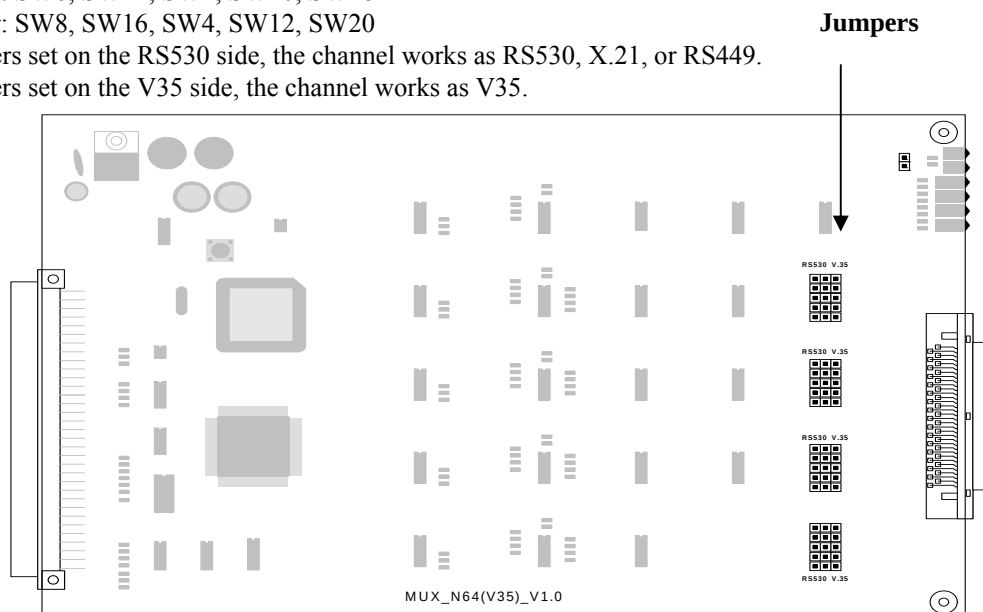
CH2 Jumper: SW5, SW13, SW1, SW9, SW7

CH3 Jumper: SW6, SW14, SW2, SW10, SW18

CH4 Jumper: SW8, SW16, SW4, SW12, SW20

When jumpers set on the RS530 side, the channel works as RS530, X.21, or RS449.

When jumpers set on the V35 side, the channel works as V35.



4.2 N64 Card

4.3 E&M Card

4.3.1 E&M Type Setting

See Fig4-1: 2W is 2 Wire mode , 4W is 4 Wire mode

4.3.2 Signaling Type Setting

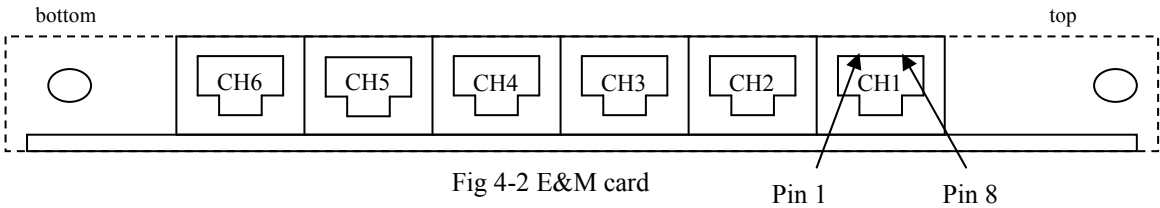
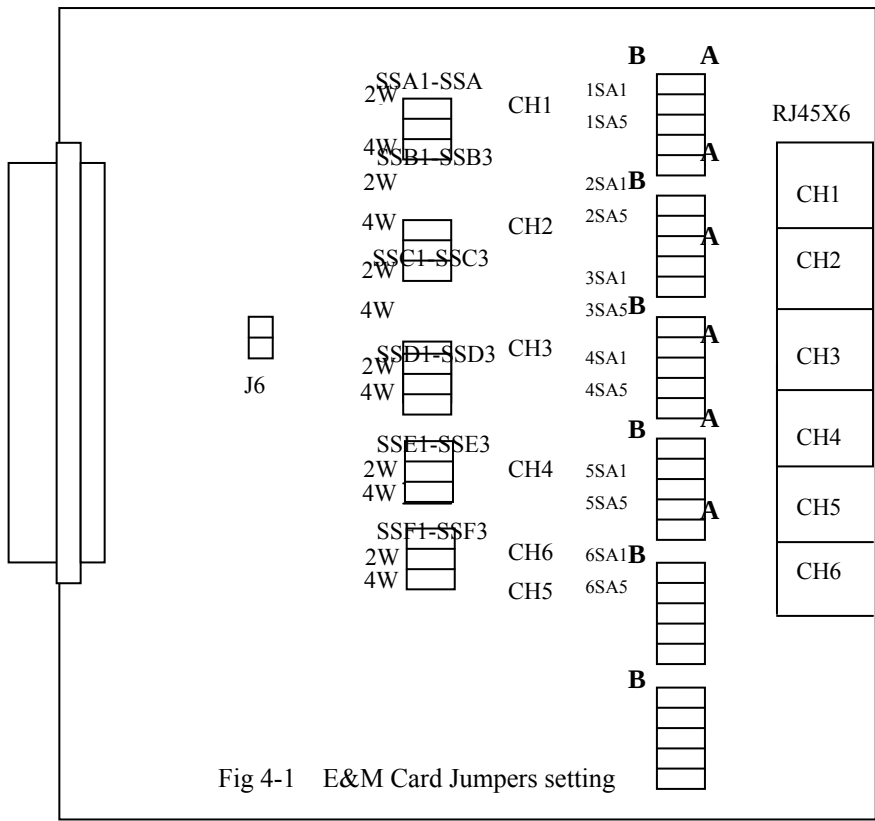
For the Audio , E&M-V4 card can be supported no signaling , the LEDs are condition of the data .
When no signaling , in fig4-1 , the J6 should be shorted.

4.3.3 E&M Signaling Type Setting

Table 4-1 A means connected to A side, B means connected to B side, C means not connected.

Jumper	Jumper setting				
	TYPE 1	TYPE 2	TYPE 3	TYPE 4	TYPE 5
S1	B	B	B	A	A
S2	C	A	A	B	C
S3	A	B	A	B	A
S4	B	B	B	A	A
S5	B	B	B	A	A

Table 4-1 : 5 kind of Signaling Type S1-S5 setting



Chapter 5 Console Operation

This chapter introduces how to configure the ERM-MUX/PLUS using console terminal mode.

5.1 Initial Setup

Before beginning, please connect ERM-MUX/PLUS to the serial port of a standard terminal or emulation terminal, such as HyperTerminal program on a Windows® PC. The parameter settings for HyperTerminal are: baud rate 9600 bps (bits per second), data bits 8, stop bit 1, no parity check, and no flow control.

Note: When there are two CPU cards, one CPU card will be the backup to the active one automatically after booting the system. Please connect the terminal to the active CPU from the front panel.

5.1.1 Boot

If the system has already booted, initialize configuration. If the system has been set up, load the parameters saved in computer and configure the system. The terminal will display:

```
INIT WAIT .....  
SYSTEM PARAMETER SAVE OK!
```

The system will search for each card, and set up with current parameters. If there are no current parameters, omit this step.

```
INITIALIZING, PLEASE WAIT .....
```

Then it searches each module, and sets system by current parameters (if there are no current parameters, this item won't show)

```
START CONFIG.....
```

```
C/B :BOARD SET OK  
E1A 8*E1 :BOARD SET OK  
E1B 8*E1 :BOARD SET OK  
slot 02 A/SYNC-128K :BOARD SET  
OK  
slot 03 E&M :BOARD SET OK  
slot 04 FX0 :BOARD SET OK  
slot 06 FXS :BOARD SET OK  
  
slot 01 N64K-V35 :BOARD NEW  
ADDED  
slot 05 G703-64K :BOARD NEW  
ADDED
```

Next will display the configuration and status of each card.

```
C/B NORMAL  
FAN 1 NORMAL  
FAN 2 NORMAL  
FAN 3 NORMAL  
FAN 4 NORMAL  
FAN 5 NORMAL  
POWER A NORMAL  
POWER B EMPTY  
CPU A NORMAL  
E1A 8*E1 NORMAL  
... ..  
E1B 8*E1 NORMAL  
... ..  
SLOT 01 N64/V35 NORMAL  
... ..  
SLOT 02 A/SYNC-128K NORMAL  
... ..  
SLOT 03 E&M NORMAL  
... ..
```

```
SLOT 04 FX0 NORMAL
... ..
SLOT 05 G703-64K NORMAL
... ..
SLOT 06 FXS NORMAL
```

The configuration and status of other cards will be seen later in this chapter. Press ESC or enter at the menu.

At this point, the console monitors the status of each card and displays the status of configuration changed on the terminal.

```
E1A 8*E1 LINE 1 SIGNAL LOSS
E1A 8*E1 LINE 2 SYNC LOSS
E1A 8*E1 LINE 3 SIGNAL LOSS
E1A 8*E1 LINE 4 SIGNAL LOSS
E1A 8*E1 LINE 5 SIGNAL LOSS
E1A 8*E1 LINE 6 SIGNAL LOSS
E1A 8*E1 LINE 7 SIGNAL LOSS
E1A 8*E1 LINE 8 SIGNAL LOSS
E1B 8*E1 LINE 1 SIGNAL LOSS
E1B 8*E1 LINE 2 SIGNAL LOSS
E1B 8*E1 LINE 3 SIGNAL LOSS
E1B 8*E1 LINE 4 SIGNAL LOSS
E1B 8*E1 LINE 5 SIGNAL LOSS
E1B 8*E1 LINE 6 SIGNAL LOSS
E1B 8*E1 LINE 7 SIGNAL LOSS
E1B 8*E1 LINE 8 SIGNAL LOSS
CONNECT TO NET MANAGER...
EXIT FROM NET MANAGER.
```

5.1.2 Input Password

Under console monitor, operations such as modifying parameters can be done only after inputting password at the prompt.

The system displays:

PLEASE INPUT PASSWORD:

The password must be six-characters and can contain any letter or number. You can try again if the wrong password is input. The default factory password is '111111' (no quotes). The system will show * for each character input. Press "ESC" key will escape from input. With the correct password keyed in, you may start with menu configuration.

5.1.3 Main Menu

<< MAIN MENU >>		Menu Description
1 . E1 CONFIG		Browse and modify E1 card parameters
2 . I/O CONFIG		Browse and modify I/O card parameters
3 . DISPLAY CONFIG		Display configuration parameters
4 . CONFIG		Configure and save
5 . SAVE DEFAULT		Set the device as default
6 . SET SYSTEM		Browse and modify system parameters
7 . BERT		Bit Error Rate Test
0 . EXIT		Exit menu to monitor mode
INPUT SELECT:		

Press number key 1 to 7 to enter corresponding menu.

Or press 0 or ESC to return to the monitor mode.

5.2 Set E1 card

Press 1 from the main menu to configure the E1 card. If no E1 card is found, the display shows:

NO E1 CARD

If the types of two E1 cards are inconsistent, the display shows:

INPUT E1 LINE(1-8):1

Press number key 1 to 8 to enter a corresponding sub menu of E1 channel.

Press 0 or ESC to return to the upper menu.

Once selected, the E1 card will be checked, the configuration displayed, and current status of E1 card shown.

E1-1 current parameter:

LINE:CCS,CRC4 DISABLE,NOLoop,HDB3,RECEIVE JITTA

NMP:NMP DISABLE,0

BERT:BERT DISABLE,2E11-1,NONE

E1 channel menu display

<< E1-1 CONFIG >>	Menu Description
1. E1 FRAME/TS0 PASS	Set frame mode and timeslot 0 bypass
2. E1 CRC	Set CRC-4 mode
3. E1 LOOP	Set loop back test mode
4. CODE	Set E1 line code
5. JITTER	Set E1 JITTER
6. TIMESLOT CROSS	Set timeslot cross connections
0. EXIT	Return to the upper menu
INPUT SELECT:	

Press number key 1 to 6 to enter the corresponding sub menu.

Press 0 or ESC return to the upper menu.

5.2.1 Set Frame Mode

From the E1 channel menu, select 1 to enter frame mode configuration. The menu displays:

<< E1-1 CONFIG - FRAME/TS0 >>	Menu Description
*1. CCS(31 SLOTS)	Sets the E1 framing
2. CAS (30 SLOTS)	
3. CCS TS0 PASS(31 SLOTS)	(CCS+TimeSlot0 Pass)
4. CAS TS0 PASS(30 SLOTS)	(CAS+ TimeSlot0 Pass)
0. EXIT	Return to the upper menu
INPUT SELECT:	

('*' indicates the current setting.)

Press number 1 to 4 to configure and press 0 or ESC return to the upper menu. After selecting a number, the menu will refresh, and '*' will indicate the new setting.

5.2.2 Set CRC Mode

From the E1 channel menu, select 2 to enter CRC mode configuration. The menu displays:

<< E1-1 CONFIG - CRC4 >>	Menu Description
1.CRC4 ENABLE	With CRC check
*2.CRC4 DISABLE	No CRC check
0. EXIT	Return to the upper menu
INPUT SELECT:	

('*' indicates the current setting.)

Press number 1 to 2 to configure and press 0 or ESC return to the upper menu. After selecting a number, the menu will refresh, and '*' will indicate the new setting.

5.2.3 Set Loop Back

From the E1 channel menu, select 3 to enter Loop mode configuration. The menu displays:

<< E1-1 CONFIG - LOOP >>	Menu Description
*1.NO LOOP	No loop
2.LOCAL LOOP	Local loop
3.TO REMOTE LOOP	Turn to remote loop
0. EXIT	Return to the upper menu
INPUT SELECT:	

(* indicates the current setting.)

Press number 1 to 3 to configure and press 0 or ESC return to the upper menu. After selecting a number, the menu will refresh, and '*' will indicate the new setting.

5.2.4 Set Line Code

From the E1 channel menu, select 4 to enter code configuration, the menu displays:

<< E1-1 CONFIG -CODE >>	Menu Description
*1.HDB3	Sets the E1 line coding
2.AMI	
0. EXIT	Return to the upper menu
INPUT SELECT:	

(* indicates the current setting.)

Press number 1 or 2 to configure and press 0 or ESC return to the upper menu. After selecting a number, the menu will refresh, and '*' will indicate the new setting.

5.2.5 Set JITTER

From the E1 channel menu, select 5 to enter code configuration, the menu displays:

<< E1-1 CONFIG - JITTER >>	Menu Description
*1. RX	Setu the E1 Jitter
2. TX	
0. EXIT	Return to the upper menu
INPUT SELECT:	

(* indicates the current setting.)

Press number 1 or 2 to configure and press 0 or ESC return to the upper menu. After selecting a number, the menu will refresh, and '*' will indicate the new setting.

5.2.6 Set Timeslot Cross Connect

From the E1 channel menu, select 6 to enter timeslot cross configuration, the menu displays:

<< E1 CONFIG-E1A1- TIMESLOT>>	Menu Description
1. SETUP CROSS	Setup the E1 cross connection
2. CANCEL CROSS	
0. EXIT	Return to the upper menu
INPUT SELECT:	

Press 1 to display free timeslots of all 8 E1 channels and the current status of timeslot cross.

FREE TIMESLOT IS:

E1-1: 0-31,

CURRENT CROSS:

E1-1: CROSS TIMESLOT: NULL

INPUT TIMESLOT:1-20/2:1-20

E1-1 CROSS TIMESLOT: 01-20/02:01-20,

The current status means the timeslots 1 to 20 of channel E1A1 are going to the timeslots 1 to 20 of channel E1A2.

INPUT EXAMPLE: 11-20/3:11-20, 21/3:21

[1->E1A1, 2->E1A2, 3->E1A3, 4->E1A4, 5->E1A5, 6->E1A6, 7->E1A7, 8->E1A8]

The example means the timeslots 11 to 20 of channel E1A1 go to the timeslots 11 to 20 of channel E1A3, and timeslot 21 goes from E1A1 to E1A3.

INPUT TIMESLOT:1-20/2:1-20

After inputting timeslot crossing, the results will be displayed.

E1A1 CROSS TIMESLOT: 1-20/2:1-20,

Press 2 to clear timeslot cross of the current E1 channel, say E1A1.

CLEAR ALL CROSS SETUP,ARE YOU SURE(Y/N)?Y

Press 0 or ESC to return to the upper menu.

5.3 Set I/O card

From the main menu, press 2 to check I/O card. The display shows the slot number for each I/O card:

IO CONFIG

SEARCH.....

BOARD NO:1,2,3,4,5,6; If there are no I/O cards, "NULL" be displayed.

INPUT BOARD NO:

Input the slot number to enter the corresponding configuration menu for that card. If the selected slot is empty, then the warning message will display:

THE NO. BOARD IS EXIT

INPUT PLEASE,AGAIN!

BOARD NO:1,2,3,4,5,6;

INPUT BOARD NO:

5.3.1 N64K/V35 card configuration

Selecting one N64K/V35 card for configuration. The console will display the current configuration and status information of the N64K/V35 card selected.

slot 1 N64/V35 , STAT:NORMAL

The display shows the slot number, card type, card status, and status of each channel

CH1:E1-1:1-10 , INTERNAL CLOCK,NORMAL, MARK(TD), MARK(RD)DTR:ON, RTS:ON

CH1:E1NO:NULL,DCE, INTERNAL CLOCK, NOLOOP

The status of each channel, including multiplexed E1 channel, timeslot, clock mode, loop mode are displayed

CH2:NULL, INTERNAL CLOCK, NORMAL, MARK(TD), MARK(RD)DTR:ON, RTS:ON

CH3:NULL, INTERNAL CLOCK, NORMAL, MARK(TD), MARK(RD)DTR:ON, RTS:ON

CH4:NULL, INTERNAL CLOCK, NORMAL, MARK(TD), MARK(RD)DTR:ON, RTS:0

5.3.2 N64K/V35 menu display

<< I/O CONFIG-N64K-V35 >>	Menu Description
1. CHANNEL 1	Set channel 1
2. CHANNEL 2	Set channel 2
3. CHANNEL 3	Set channel 3
4. CHANNEL 4	Set channel 4
0. EXIT	Return to the I/O card configuration
INPUT SELECT:1	

Press 0 or ESC to return to the I/O card selection menu. Press 1-4 to enter SYNC channel configuration. (The same configuration menus apply for channels 1 to 4).

5.3.3 N64K/V35 channel menu display

Select a channel, for example channel 1, and enter configuration menu. The menu displays the following:

<< IO CONFIG-N64K-V35-CHANNEL 1 >>	Menu Description
1. E1/TIMESLOT	Set multiplex E1 channel/timeslot
2. LOOP	Set loop
3. CLOCK	Set clock mode
0.EXIT	Return to the upper menu
INPUT SELECT:	

Press 0 or ESC return to the upper menu. Press 1-3 to enter the corresponding configuration item.

5.3.4 Set multiplex E1 number

Press 1 to enter the configuration menu of setting E1 channel. The menu displays:

FREE TIMESLOT IS:	Menu Description
1: 1-31,	E1-1 free timeslot
2: 1-31,	E1-2 free timeslot
3: 1-31,	E1-3 free timeslot
4: 1-31,	E1-4 free timeslot
5: 1-31,	E1-5 free timeslot
6: 1-31,	E1-6 free timeslot
7: 1-31,	E1-7 free timeslot
8: 1-31,	E1-8 free timeslot
CURRENT:E1-1:1-10	
USAGE: 3-9,11	
INPUT E1 LINE(1-8)	

The display also shows any current status if there are any timeslots connection from any E1.

CURRENT:E1A1-NULL

INPUT EXAMPLE: 3-9,11

INPUT TIMESLOT: 3-9,11

One or more idle timeslots can be assigned to one N64 I/O channel:

You can assign one single timeslot number or consecutive timeslot numbers. For example, "5,10-20,27" means the timeslots 5, 10 to 20, and 27 of E1A1 (selected earlier) are assigned to CH1 of I/O card. Input the idle timeslot number(s) and press Enter to confirm. Return to the upper menu.

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If the input timeslot has already been assigned previously, the system will prompt:

Press 0 or ESC return to the upper menu. Press 1-8 to enter the E1 configuration item

THE TIMESLOT ALREADY USED!

INPUT AGAIN!

INPUT TIMESLOT:

If no timeslot number has been input, then press Enter or ESC to return to the upper menu.

5.3.5 Set loop mode

Press 4 to set loop mode of I/O channel. The menu displays

<< IO CONFIG-N64K-V35-CHANNEL 1-LOOPBACK >>		Menu Description
*1. NORMAL		Without loop
2. LOCAL LOOP		
3. REMOTE LOOP		
4. LOOP		
0. EXIT		Return to the upper menu
INPUT SELECT:0		

(* indicates the current setting.)

Press 1 - 4 to select the loop back configuration. Press 0 or ESC to return to the upper menu. After key 1 -4 is pressed, the menu will be shown again, and '*' will indicate the new setting.

5.3.6 Set clock mode

Press 6 to set the clock mode of the I/O channel. The menu displays

<< I/O CONFIG-N64/V35-CHANNEL 1-CLOCK >>		Menu Description
*1. INTERNAL		Set internal clock
2. EXTERNAL		Set external clock
0. EXIT		Return to the upper menu
INPUT SELECT:0		

(* indicates the current setting.)

Press 1 or 2 to select the clock mode configuration. Press 0 or ESC to return to the upper menu. After keying 1 or 2, the menu will be shown again, and '*' will indicate the new setting.

5.4 Set RS-232 Card

Please refer to N64K/V35 configuration settings which are applied the same way to RS-232 card.

5.5 Set G703-64K Card

When entering the G703-64K card configuration under the I/O card sub-menu, the display will show the current configuration and status information of the G703-64K card selected.

slot 5 G703-64K STAT:NORMAL

Slot number card type card status

CH1:NOE1:NULL, INTERNAL CLOCK, NOLOOP, NORMAL, SIGNAL LOSS

The display shows the status of each channel, including multiplexed E1 channel, timeslot, clock mode, loop mode.

CH2:NOE1:NULL, INTERNAL CLOCK, NOLOOP, NORMAL, SIGNAL LOSS

CH3:NOE1:NULL, INTERNAL CLOCK, NOLOOP, NORMAL, SIGNAL LOSS

CH4:NOE1:NULL, INTERNAL CLOCK, NOLOOP, NORMAL, SIGNAL LOSS

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5.5.1 G703-64K menu display

<< I/O CONFIG-G703-64K >>	Menu Description
1. CHANNEL 1	Set channel 1
2. CHANNEL 2	Set channel 2
3. CHANNEL 3	Set channel 3
4. CHANNEL 4	Set channel 4
0. EXIT	Return to the input box of I/O configuration
INPUT SELECT:1	

Press 0 or ESC to return to the main menu of I/O configuration.

Press 1 to 4, to enter the channel configuration for the G703-64K channel. The procedure is the same for each channel, 1-4. The basic settings are similar to those of the N64K/V35, however, each channel can be assigned only one timeslot (64kbps).

5.6 Set A/SYNC-128K Card

When entering the A/SYNC-128K card configuration under the I/O card sub-menu, the display will show the current configuration and status information of the A/SYNC-128K card selected

```
slot 2 A/SYNC-128K ,    STAT:NORMAL
CH1:NULL,INTERNAL  CLOCK,NORMAL,MARK(TD),MARK(RD)DTR:OFF,RTS:OFF
CH2:NULL,INTERNAL  CLOCK,NORMAL,MARK(TD),MARK(RD)DTR:OFF,RTS:OFF
CH3:NULL,INTERNAL  CLOCK,NORMAL,MARK(TD),MARK(RD)DTR:OFF,RTS:OFF
CH4:NULL,INTERNAL  CLOCK,NORMAL,MARK(TD),MARK(RD)DTR:OFF,RTS:OFF
CH5:NULL,INTERNAL  CLOCK,NORMAL,MARK(TD),MARK(RD)DTR:OFF,RTS:OFF
CH6:NULL,INTERNAL  CLOCK,NORMAL,MARK(TD),MARK(RD)DTR:OFF,RTS:OFF
```

5.6.1 A/SYNC-RS232 menu display

<< I/O CONFIG-A/SYNC-128K >>	Menu Description
1. CHANNEL 1	Set channel 1
2. CHANNEL 2	Set channel 2
3. CHANNEL 3	Set channel 3
4. CHANNEL 4	Set channel 4
5. CHANNEL 5	Set channel 5
6. CHANNEL 6	Set channel 6
0. EXIT	Return to the input box of I/O configuration
INPUT SELECT:	

Press 0 or ESC to return to the main menu of I/O configuration.

Press 1 to 6, to enter the channel configuration for the A/SYNC channel. The procedure is the same for each channel, 1-6. The basic settings are similar to those of the N64K/V35, however, each channel can be assigned only one timeslot (64kbps).

5.6.2 A/SYNC-RS232 Channel menu display

When selecting one A/SYNC-RS232 channel, for example CH1, the menu displays:

<< IO CONFIG-RS232-CHANNEL 1 >>	Menu Description
1. E1/TIMESLOT	Set multiplex E1 channel
2. LOOP	Set loop
3. CLOCK	Set clock
0.EXIT	Return to the upper menu
INPUT SELECT:	

Press 0 or ESC return to the upper menu. Press 1 -3 to enter the corresponding configuration sub-menu.

The subsequent procedure is the same as N64K/V35 configuration. However, only one timeslot can be assigned to one channel.

5.7 Set FXS card

When entering the FXS card configuration under the I/O card sub-menu, the system checks and displays the current configuration and status information of the FXS card selected.

```
slot 6 FXS ,      STAT:NORMAL
Slot number card type card status
CH1:NOE1:NULL,NORMAL,NORMAL
```

The display shows the status of each channel, including multiplexed E1 channel, timeslot, clock mode, loop mode.

```
CH2:NOE1:NULL,NORMAL,NORMAL
CH3:NOE1:NULL,NORMAL,NORMAL
CH4:NOE1:NULL,NORMAL,NORMAL
CH5:NOE1:NULL,NORMAL,NORMAL
CH6:NOE1:NULL,NORMAL,NORMAL
```

5.7.1 FXS menu display

<< I/O CONFIG-FXS >>	Menu Description
1. CHANNEL 1	Set channel 1
2. CHANNEL 2	Set channel 2
3. CHANNEL 3	Set channel 3
4. CHANNEL 4	Set channel 4
5. CHANNEL 5	Set channel 5
6. CHANNEL 6	Set channel 6
0. EXIT	Return to the main menu of IO card
INPUT SELECT:	

Press 0 or ESC to return to the I/O card sub-menu.

Press 1 to 6 to enter the FXS channel configuration. The setting procedure is the same for each channel, 1-6.

5.7.2 Channel menu display

When selecting one FXS channel, for example CH1, the menu displays:

<< IO CONFIG-FXS-CHANNEL 1 >>	Menu Description
1. E1/TIMESLOT	Set multiplex E1 channel
2. WORK MODE	Set work mode
0.EXIT	Return to the upper menu
INPUT SELECT:	

Press 0 or ESC return to the upper menu. Press 1 to enter the corresponding configuration sub-menu. The subsequent procedure is the same as N64K/V35 configuration. However, only one timeslot can be assigned to one channel.

Press 2 to enter the configuration of work mode.

5.7.3 Set Work mode

Press 2 to set work mode of the FXS channel. The menu will display:

<< IO CONFIG-FXS-CHANNEL 1-WORK >>	Menu Description
*1. NORMAL	
2. HOTLINE	Set hot line (off-hook will ring remote side)
0. EXIT	Return to the upper menu
INPUT SELECT:0	

('*'indicates the current setting.)

Press number 1 to 2 to configure and press 0 or ESC to return to the upper menu. After selection, the menu will refresh, and '*' will indicate the new setting.

5.8 Set FXO Card

Please refer to FXS configuration menu. The settings for FXO are the same, with the exception that there is no work mode setting for the FXO cards. (Only FXS supports the 'hot line' function.).

5.9 Set E&M Card

When entering the E&M card configuration under the I/O card sub-menu, the system checks and displays the current configuration and status information of the E&M card selected

slot 3 E&M STATE:NORMAL

Slot number card type card status

CH1:NOE1:NULL,NORMAL,1.5db,2.0db

The display shows the status of each channel, including multiplexed E1 channel, timeslot, clock mode, loop mode, TX LEVEL, RX LEVEL

CH2:NOE1:NULL,NORMAL,0.0db,0.0db

CH3:NOE1:NULL,NORMAL,0.0db,0.0db

CH4:NOE1:NULL,NORMAL,0.0db,0.0db

CH5:NOE1:NULL,NORMAL,0.0db,0.0db

CH6:NOE1:NULL,NORMAL,0.0db,0.0db

5.9.1 E&M MENU DISPLAY

<< I/O CONFIG-E&M >>	Menu Description
1. CHANNEL 1	Set channel 1
2. CHANNEL 2	Set channel 2
3. CHANNEL 3	Set channel 3
4. CHANNEL 4	Set channel 4
5. CHANNEL 5	Set channel 5
6. CHANNEL 6	Set channel 1
0. EXIT	Return to the main menu of IO card
INPUT SELECT:	

Press 0 or ESC to return to the I/O card sub-menu.

Press 1 to 6 to enter the E&M channel configuration. The setting procedure is the same for each channel, 1-6.

5.9.2 E&M Channel menu display

When selecting one E&M channel, for example CH1, the menu displays:

<< I/O CONFIG-E&M-CHANNEL 1 >>	Menu Description
1. E1/TIMESLOT	Set multiplex E1 channel
2. LOOP	
3. TX LEVEL	
4. RX LEVEL	
0.EXIT	Return to the upper menu
INPUT SELECT:	

Press 0 or ESC return to the upper menu. Press 1 or 2 to enter the corresponding configuration sub-menu. The subsequent procedure is the same as N64K/V35 configuration. However, only one timeslot can be assigned to one channel.

Press 3 or 4 to enter the TX/RX level

Current Tx level:1.5db

INPUT DB(-20...+8):

5.10 Set X.50 Card

When entering the X.50 card configuration under the I/O card sub-menu, the system checks and displays the current configuration and status information of the X.50 card selected

5.11 Set ET100 Card

When entering the ET100 card configuration under the I/O card sub-menu, the system checks and displays the current configuration and status information of the ET100 card selected

```
slot 6 ET100      STATE:NORMAL
CH1:NULL, ANEG ENABLE, FULL, 100M, FLOW CONTROL DISABLE, AUTO MAC ENABLE, NOLOOP
CH2:NULL, ANEG ENABLE, FULL, 100M, FLOW CONTROL DISABLE, AUTO MAC ENABLE, NOLOOP
<<I/O CONFIG-ET100
```

- 1. CHANNEL 1
- 2. CHANNEL 2
- 0. EXIT

INPUT SELECT:1

```
<< I/O CONFIG-ET100-CHANNEL 1>>
```

- 1. E1/TIMESLOT
- 2. AUTO-NEGOT
- 3. COMMUNICATION MODE
- 4. SPEED
- 5. FLOW CONTROL
- 6. MAC FILTERING
- 7. LOCAL LOOP
- 0. EXIT

INPUT SELECT:

Press 0 or ESC return to the upper menu.

Press 1 ~ 7 to enter the corresponding configuration sub-menu.

5.11.1 Set multiplex E1 number

Press 1 to display the configuration menu of setting E1 channel. The menu displays:

FREE TIMESLOT IS:	Menu Description
1: 1-31,	E1-1 free timeslot
2: 1-31,	E1-2 free timeslot
3: 1-31,	E1-3 free timeslot
4: 1-31,	E1-4 free timeslot
5: 1-31,	E1-5 free timeslot
6: 1-31,	E1-6 free timeslot
7: 1-31,	E1-7 free timeslot
8: 1-31,	E1-8 free timeslot
CURRENT:E1-1:1-10	ET-100-channel used E1 time slot
USAGE: 3-9,11	

INPUT E1 LINE(1-8)

Select E1 line (1-8), Press 0 or ESC return to the upper menu

5.11.2 Set Auto Negotiation

Press 2 to display the configuration menu of setting Auto Negotiation. The menu displays:

INPUT SELECT : 2

<< I/O CONFIG-ET100-CHANNEL 1-AUTO NEGOTIATION >>

- 1. ENABLE
- 2. DISABLE
- 0. EXIT

INPUT SELECT:

5.11.3 Set Full / Half Duplex

Press 3 to display the configuration menu of setting Full/Half duplex. The menu displays:

INPUT SELECT : 3

<< I/O CONFIG-ET100-CHANNEL 1-COMMUNICATION MODE >>

- 1.FULL
- 2.HALF
- 0.EXIT

INPUT SELECT :

5.11.4 Set UTP Port Speed

Press 4 to display the configuration menu of setting UTP Port Speed. The menu displays:

INPUT SELECT : 4

<< I/O CONFIG-ET100-CHANNEL 1-SPEED >>

- 1.100M
- 2.10M
- 0.EXIT

INPUT SELECT :

5.11.5 Set Flow Control

Press 5 to display the configuration menu of setting Flow Control. The menu displays:

INPUT SELECT : 5

<< I/O CONFIG-ET100-CHANNEL 1-FLOW CONTROL >>

- 1.DISABLE
- 2.ENABLE
- 0.EXIT

INPUT SELECT :

5.11.6 Set MAC FILTERING

Press 6 to display the configuration menu of setting MAC FILTERING. The menu displays:

INPUT SELECT : 6

<< I/O CONFIG-ET100-CHANNEL 1-MAC FILTERING >>

- 1.ENABLE
- 2.DISABLE
- 0.EXIT

INPUT SELECT :

5.11.7 Set Local Loop

Press 7 to display the configuration menu of setting Local Loop. The menu displays:

INPUT SELECT : 7

<< I/O CONFIG-ET100-CHANNEL 1-Local Loop >>

- 1.NO LOOP
- 2.LOOP
- 0.EXIT

INPUT SELECT :

5.12 Set RS485/422 Card

When entering the RS485/422 card configuration under the I/O card sub-menu, the system checks and displays the current configuration and status information of the ET100 card selected

INPUT BOARD NO:6

Slot 6 RS485 STAT:NORMAL

CH1:E1-2	: 1- 6,	NORMAL,	MARK(TD),	MARK(RD)
CH2:E1-2	: 7-12,	NORMAL,	MARK(TD),	MARK(RD)
CH3:E1-2	:13-15, 17-19,	NORMAL,	MARK(TD),	MARK(RD)
CH4:E1-2	:20-25,	NORMAL,	MARK(TD),	MARK(RD)
CH5:E1-2	:26-27,	NORMAL,	MARK(TD),	MARK(RD)
CH6:E1-2	:28-30,	NORMAL,	MARK(TD),	MARK(RD)

5.12.1 RS485 Configuration Menu

<< I/O CONFIG-RS485 >>

- 1.CHANNEL 1
- 2.CHANNEL 2
- 3.CHANNEL 3
- 4.CHANNEL 4
- 5.CHANNEL 5
- 6.CHANNEL 6
- 0.EXIT

INPUT SELECT

Press 0 or ESC return to the I/O configuration sub-menu.

Press 1 ~ 6 to enter the RS485 channels configuration.

5.12.2 RS485 Channel Configuration Display

When entering the RS485 card configuration under the RS485 channel configuration sub-menu (CHANNEL ONE FOR EXAMPLE), the system checks and displays the current configuration and status information of the RS485 channel

<< I/O CONFIG-RS485-CHANNEL 1 >>

- 1.E1/TIMESLOT
- 2.LOOP
- 0.EXIT

INPUT SELECT

Press 0 or ESC return to the upper menu.

Press 1 or 2 to enter the RS485 channel configuration

5.12.3 Set multiplex E1 number

Press 1 to display the configuration menu of setting E1 channel. The menu displays:

FREE TIMESLOT IS:	Menu Description
1: 1-31,	E1-1 free timeslot
2: 1-31,	E1-2 free timeslot
3: 1-31,	E1-3 free timeslot
4: 1-31,	E1-4 free timeslot
5: 1-31,	E1-5 free timeslot
6: 1-31,	E1-6 free timeslot
7: 1-31,	E1-7 free timeslot
8: 1-31,	E1-8 free timeslot
CURRENT: E1-1:1-10	RS485-channel used E1 time slot
USAGE: 3-9,11	
INPUT E1 LINE(1-8)	

Select E1 line (1-8), Press 0 or ESC return to the upper menu

5.12.4 Set Loopback

Press 2 to display the configuration menu of setting Loopback. The menu displays:

```
<< I/O CONFIG-RS485-CHANNEL 1-LOOPBACK >>
  *1.NORMAL
  2.LOCAL LOOP
  3.REMOTE LOOP
  4.LOOP
  0.EXIT
INPUT SELECT : 0
(*): current setting)
```

Press 0 or ESC return to the upper menu.

Press 1 ~ 4 to change Loopback configuration ("*" will follow the new setting)

5.13 Display devices configuration

Press 3 from the main menu. The system displays the configuration and status of each module, including CPU, E1, and I/O cards.

<< DISPLAY CONFIG >>	Menu Description
1. DISPLAY BOARD DETAIL	Display card configuration
2. DISPLAY WORK STATE	Display device and working status of card
0. EXIT	Return to the main menu
INPUT SELECT:1	

Pressing 1 will show the following status:

Presence of cards

Working status

Configuration parameters

Note: The system will not automatically refresh when in "3.DISPLAY CONFIG", only in the main menu 2, 4, & 5.

Press 2 to display the working status of each plug-in module, including CPU, power, fan, E1, and I/O cards. The system will refresh in real time. It will also display the status of G.703 external-clock device, if any is present.

Press 0 or ESC to return to the main menu.

After pressing 1, the system will display statuses in order for CPU card, E1 card and I/O cards. The following is a configuration example.

5.14 Save Configuration

All previously outlined modified configurations are saved temporarily in volatile ram. If the chassis is powered off or the CPU card removed, the settings will revert back to the previously saved ones. Following the settings done previously, the changes must be written to non-volatile ram. From the main menu, item 4 CONFIG, is the utility to save all the configuration settings. It is also highly recommended to do save settings following all major configuration sections. For example, save after doing system configuration, save again after setting E1 parameters, and finally save after setting each I/O card. Configurations which are modified are only saved temporarily.

After pressing 4 in the main menu, the system asks:

SYSTEM WILL BE CONFIGED,ARE YOU SURE(Y/N)?y

Press N or n to escape.

Press Y or y to start saving the configuration.

START CONFIG.....

The system will now check all the new settings for each card and display the results of save configuration, success or failure.

C/B :BOARD SET OK

E1A 8*E1 :BOARD SET OK

E1B 8*E1 :BOARD SET OK

slot 1 N64/V35 :BOARD SET OK

slot 2 A/SYNC-128K :BOARD SET OK

slot 3 E&M :BOARD SET OK

slot 4 FX0 :BOARD SET OK

slot 5 G703-64K :BOARD SET OK

slot 6 FXS :BOARD SET OK

5.15 Reset Device Configuration to Default

After pressing 5 from the main menu, the system asks to recover to default.

YOU WILL RECOVER SYSTEM TO DEFAULT!

ARE YOU SURE(Y/N)?y

Press Y or y to start setting the device to default. Once started, it can not be stopped.

Please Wait....

START CONFIG.....

The system will check each card and display the result of recovery operation, success or failure.

5.16 Browse/Modify System Parameters

From the main menu select "6.SET SYSTEM". The display will show:

<< SYSTEM MENU >>		Menu Description
1. VERSION		Display system version
2. CLOCK		Browse/ modify device clock
3. NMP CONFIG		Modify NMP configuration
4. E1 BACKUP		Modify backup mode of device E1
5. CHANGE PASSWORD		Modify system password
6. SETUP TIME		Modify device time
7. SETUP EXTEND BOX		Modify EXTEND BOX
0. EXIT		Return to the input box of the main menu
INPUT SELECT:1		

Press 0 or ESC return to the main menu. Press 1 to 6 to get system info and/or modify the configuration.

5.16.1 Display system version

Press 1 to enter the VERSION mode display menu

ERM-MUX-PLUS version 4.00

5.16.2 Modify System Clock

Press 2 to enter the CLOCK mode configuration menu. The menu will display:

<< SYSTEM CONFIG-CLOCK >>	Menu Description
1. INT OSC	Internal OSC is source
2. IO CLOCK	Set I/O as external clock
3. EXTERNAL CLOCK	Set external clock
*4. E1 RECOVER CLOCK [1]	E1A recover clock is source
0. EXIT	Return to the upper menu
INPUT SELECT:1	
(*'indicates current setting.)	

Press 1 to 4 to select the desired configuration, or press 0 or ESC to return to the upper menu. After configuration change by pressing key 1 to 4, the system will refresh the menu, and '*' will indicate the new setting. If IO card is selected for clock source, the system will check the I/O slots for presence of a compatible clock source cards.

For example, the system might show:

IO CLOCK VAILD BOARD SLOT:
slot 01 N64K-V35
slot 05 G703
slot 10 N64K-232
CURRENT IO CLOCK SLOT:NULL

The listed cards are all candidates for providing clock source. If entering 5, the system will show:

INPUT SLOT N0:5

Note: Only the clock from the **first channel (CH1)** of the selected slot can be used to apply clock for the whole system when the I/O card clock is used.

5.17 Modify NMP /SNMP Parameter

Please press 3 to enter "3.NMP CONFIG". The menu will display:

<< SYSTEM CONFIG-NMP >>	Menu Description
1. UP TIMESLOT	up timeslot of in-band NMP
2. DOWN TIMESLOT	down timeslot of in-band NMP
3. DISABLE NMP	Disable NMP
4. IP ADDRESS	Change IP address
5. DEVICE ADDRESS	Device address
6. DOWN DEVICE ADDRESS	Down device address of in-band NMP
0. EXIT	Return to the upper menu
INPUT SELECT:1	

5.17.1 Set up timeslot of in-band NMP

Please press 1 to enter "1. UP TIMESLOT ". The menu will display:

CURRENT:E1-1:31
INPUT TIMESLOT(INPUT 0 TO CANCEL):31

5.17.2 Set down timeslot of in-band NMP

Please press 1 to enter "2. DOWN TIMESLOT ". The menu will display:

INPUT E1 LINE(1-8):2
FREE TIMESLOT IS:2: 1-31,
CURRENT:E1-2:NULL
INPUT TIMESLOT(INPUT 0 TO CANCEL):31

5.17.3 Disable NMP

Please press 3 to enter "3. DISABLE NMP "

Disable In-band management function

Clear NMP SETUP, ARE YOU SURE (Y/N)? Y

5.17.4 Change IP address

Please press 4 to enter "4. IP ADDRESS " To change TCP/IP configuration. The following is the example for TCP/IP configuration. Enter "n" for no change.

```
CURRENT MAC ADDR:.123.123.123.123.123
INPUT NEW MAC ADDR:123n
INPUT ERR,INPUT AGAIN!
INPUT NEW MAC ADDR:n
CURRENT IP ADDR:.192.168.010.110
INPUT NEW IP ADDR:n
CURRENT SUBNET MASK:.255.255.255.000
INPUT NEW SUBNET MASK:n
CURRENT GATEWAY IP:.202.100.064.068
INPUT NEW GATEWAY IP:n
CURRENT TFTP SERVER IP:.202.102.010.010
INPUT NEW TFTP SERVER IP:n
CURRENT TFTP PATH:
INPUT NEW TFTP PATH:N
CURRENT COMMUNITY RD/WR:00000000
INPUT NEW COMMUNITY RD/WR:N
CURRENT COMMUNITY RD ONLY:00000000
INPUT NEW COMMUNITY RD ONLY:Public
CURRENT COMMUNITY RD ONLY:Public
CURRENT ACCESS IP ADDR #1:.000.000.000.000
INPUT NEW ACCESS IP ADDR #1:192.168.10.4
CURRENT ACCESS IP ADDR #1:.192.168.010.004
CURRENT ACCESS IP ADDR #2:.000.000.000.000
INPUT NEW ACCESS IP ADDR #2:192.168.10.5
CURRENT ACCESS IP ADDR #2:.192.168.010.005
CURRENT ACCESS IP ADDR #3:.000.000.000.000
INPUT NEW ACCESS IP ADDR #3:192.168.10.6
CURRENT ACCESS IP ADDR #3:.192.168.010.006
CURRENT ACCESS IP ADDR #4:.000.000.000.000
INPUT NEW ACCESS IP ADDR #4:198.168.10.7
CURRENT ACCESS IP ADDR #4:.198.168.010.007
CURRENT TELNET MANAGER:0000
INPUT NEW TELNET MANAGER:Admin
INPUT TOO LONG,INPUT AGAIN!
INPUT NEW TELNET MANAGER:User
CURRENT TELNET MANAGER:User
CURRENT TELNET PASSWORD:0000
INPUT NEW TELNET PASSWORD:user
CURRENT TELNET PASSWORD:user
```

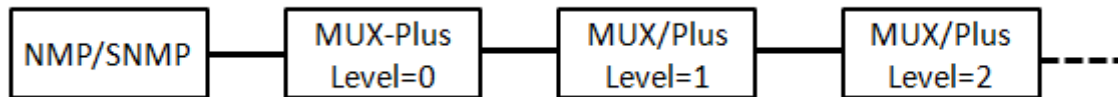
Press Enter or ESC to stop TCP/IP configuration and return to NMP/SNMP main menu.

Chapter 5 Console Operation

5.17.5 Device Address (NMP)

Please press 5 to enter "5. DEVICE ADDRESS " There are four address : ADDRESS 01, ADDRESS 02, ADDRESS 03 and LEVEL. ADDRESS 01/02/03 is NMP address. For LEVEL input :

1. If device directly connect to NMP system, then LEVEL input "0"
2. If device connect to NMP system via another MUX-PLUS, then LEVEL input 1, 2, ...



CURRENT EQUIP ADDRESS:02,00,00,00
INPUT NEW EQUIP ADDRESS:
ADDRESS 01:2
ADDRESS 02:0
ADDRESS 03:0
LEVEL: 0
NEW EQUIP ADDRESS:02,00,00,00

5.17.6 SET DOWNDEVICE ADDRESS

CURRENT DOWN DEVICE ADDRESS:2,0,0,1-2,0,0,11
INPUT 1st DOWN DEVICE ADDRESS:
ADDRESS 1:2
ADDRESS 2:0
ADDRESS 3:0
ADDRESS 5:1
INPUT 2nd DOWN DEVICE ADDRESS:
ADDRESS 1:2
ADDRESS 2:0
ADDRESS 3:0
ADDRESS 5:64
NEW DOWN DEVICE ADDRESS:2,0,0,1-2,0,0,64

5.18 SET BACKUP E1

Please press 4 to enter "4. BACKUP E1 ". The menu will display:

<< SYSTEM CONFIG-BACKUP E1 >> Menu Description

*1. DISABLE

2. ENABLE

0. EXIT

Return to the upper menu

INPUT SELECT:1

Press 0 or ESC return to the main menu. Press 1 or 2 to get system info and/or modify the configuration.

5.19 Set password

Please press 5 to enter "5. CHANGE PASSWORD ". The menu will display:

PLEASE INPUT PASSWORD:*****

INPUT NEW PASSWORD(6 BYTES):*****

INPUT NEW PASSWORD AGANI:*****

5.20 SETUP TIME

Please press 6 to enter "6. SETUP TIME ". The menu will display:

CURRENT TIME: 03-09-11,16-31-30

TIME FORMAT: YY-MM-DD,HH-MM-SS

INPUT NEW TIME:

5.21 Expansion Chassis

Please press 7 to enter "7. SETUP EXTEND BOX ". The menu will display:

```
CURRENT EXTEND BOX STATE:NO
ADD(A) OR DELETE(D) EXTERN BOX
PLEASE INPUT:A
Enter "A" to add the chassis, Enter "D" to delete the chassis
CURRENT EXTEND BOX STATE:HAVE
```

5.22 Integral BERT Test

Press 0 to ESC or press '7' from the Main Menu to enter the setup for Integral BERT

<< E1-1 BERT TEST >>	Menu Description
*1. FUNCTION	Enable/disable BERT function
2. CHANNEL	Select the channel for BER test
3. PATTERN	Select a BERT pattern
4. ERROR INSERT	Force an error to be inserted
5. RESULT	Display the BERT test results
0. EXIT	Return to previous menu

INPUT SELECT:1

To return to the main menu press either 0 or the ESC key. Press 1, 3-5 to enter the corresponding item.

Press 2 to revise E1 the BERT test channel;

INPUT E1 LINE(1-8):2

5.22.1 Set BERT Test

In the BERT test menu, press 1 to choose "modify and set BERT test" item, and the menu displays:

<< BERT TEST - FUNCTION >>	Menu Description
*1. STOP	Stop BERT test
2. OFFLINE	offline test
3. ONLINE	Online test
0. EXIT	Return to previous menu

INPUT SELECT:1

(* indicates current setting)

Press 1-3 to choose setting, press 0, Enter or ESC to return to upper menu.

Press 1-3 to display this menu again, but the position of '*' is changed with the setting value

5.22.2 Set BERT Test Pattern

In the BERT test menu, press 3 to choose "modify BERT test pattern", and the menu displays:

<< BERT TEST - PATTERN >>	Menu Description
1. 2^9-1	Select the 2e9 -1 pattern
*2. 2^11-1	Select the 2e11 -1 pattern
3. 2^15-1	Select the 2e15 -1 pattern
0. EXIT	Return to previous menu

INPUT SELECT:1

(* indicates current setting value)

Press 1-3 to choose setting, press 0, Enter or ESC to return to upper menu

Press 1-3 to display this menu again, but the position of '*' is changed with the setting value

Chapter 5 Console Operation

5.22.3 Set BERT Error Code Insert

In the BERT test menu, press 4 to choose "modify BERT error code insert", and the menu displays:

<< BERT TEST - PATTERN >>	Menu Description
*1. NONE	
2. SINGLE	Force a single bit error
3. 1E-3	Set bit error rate 1 in 1000
4. 1E-4	Set bit error rate 1 in 10,000
5. 1E-5	Set bit error rate 1 in 100,000
0. EXIT	Return to previous menu

(* indicates current setting value)

Press 1-5 to choose setting, press 0, Enter or ESC to return to upper menu

Press 1-5 to display this menu again, but the position of '*' is changed with the setting value

5.22.4 Display BERT Test Result

In BERT test menu, press 5 to display BERT test result, the menu displays:

```
<< BERT RESULT >>
E1-2 PERFORMANCE
  Bipolar violations count(BPV):0
    Current CRC-4 error count:0
      Current errored seconds(ES):0
        Current unavailable seconds(UAS):0
          Current seconds(SEC):0
            Long-term errored seconds(LES):0
              Long-term unavailable seconds(LUAS):0
                Long-term seconds(LSEC):0
                  OLD Current errored seconds(ES):0
                    OLD Current unavailable seconds(UAS):0
                      BIT ERROR:0
                        BIT ERROR RATE:0
<ESC> EXIT. <CR> CLEAR. <SPACE> REFRESH.
```

5.23 Exit menu, and Enter into the Monitoring Status

In the main menu, press 8 to exit menu and enter into the monitoring status.

```
EXIT SYSTEM, (Y/N)y
YOU EXTI MENU-PROGRAM!
```

Chapter 6 Test and Diagnostics

There are red or yellow alarm indicators on the front panel of each card, designed to indicate corresponding failure. For example, the "Sig Loss" on E1 card means that no E1 signal is received. "Sync LOSS" indicates that E1 frame synchronization errors have occurred.

This device is equipped with "E1 Local Loop" and "E1 To Remote Loop" functions, which can be used to facilitate the diagnostics and tests. These loops can be set and/or cancelled via programming (console intervention).

6.1 E1 Local Loop

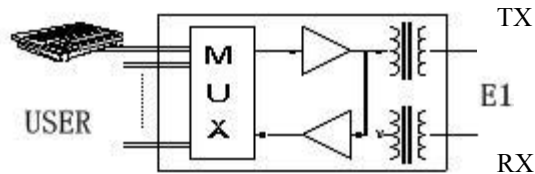


Figure 6.1: Local Loop

Near the external side of E1 interface, the RX interface is disconnected from external E1 line (see figure 6-1), then looped back from TX. This aims to test the device at the user side. Connect a bit error rate tester (such as CTC Union's HCT-6000 BERT) to any user data port to check error rate.

6.2 E1 To Remote Loop

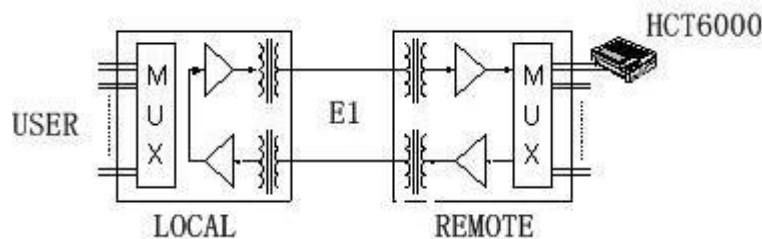


Figure 6.2: To Remote Loop

Near the external side of E1, the TX and RX are connected to form a 'To Remote Loop' (see figure 6-2), which is used to test the line and the device at the remote side. Connect a bit error rate tester (such as CTC Union's HCT-6000 BERT) to any user data port of the remote side device, and check for bit errors.

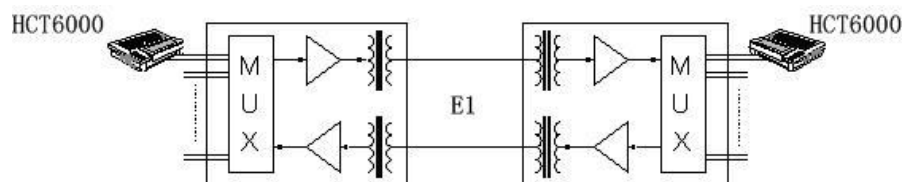


Figure 6.3: end-to-end bi-directional test

Connect BERT equipment to corresponding user ports of devices at both sides, perform error code testing, and check the data transmission quality for devices and relevant branches. Please see figure 6.3.

6.3 Loopback test for N64K/V35, A/SYNC-128K card

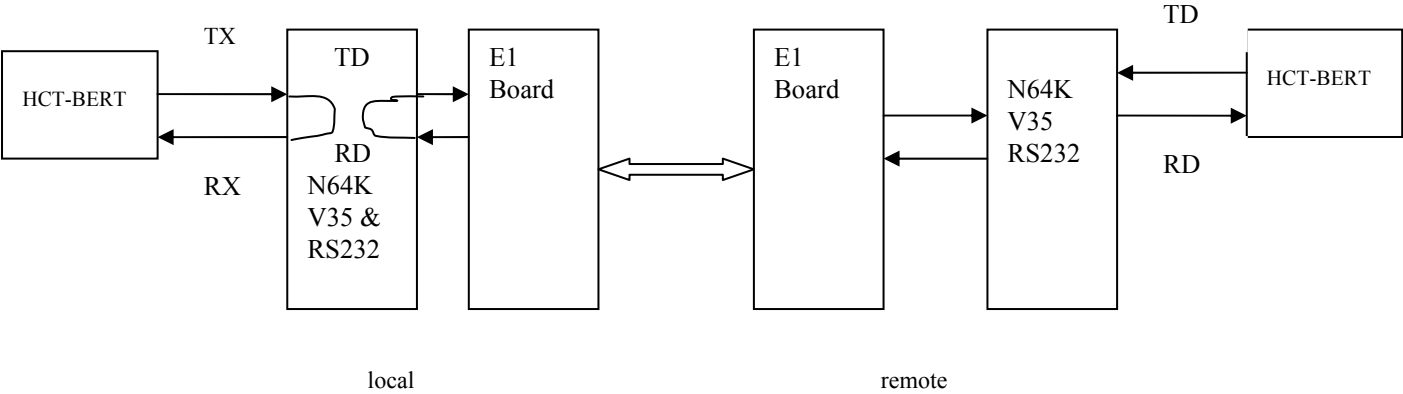


Fig. 6.4 N64 Loopback

Figure 6.4 shows the schematic diagram for loop back test for these two kinds of cards. The tested loop is bi-directional, and two BERTs should be working fine.

6.4 Loop Test for G703-64K Card

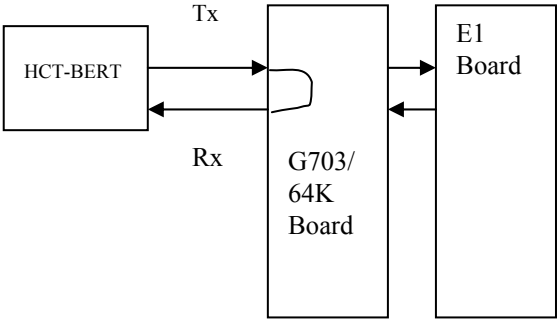


Fig. 6.5 G.703/64K Loopback

Figure 6.5 shows the schematic diagram for loop test for G703-64K card. The tested loop is a unidirectional loop.

Chapter 7 Clock & Synchronization

This chapter details the clocking schemes supported by the ERM-MUX/Plus.

7.1 Setting clock for whole machine

7.1.1 E1A1-8's Recover clock

MUX/PLUS will pick up recovery clock from E1A1 line received signal, and treat it as the clock source for the whole machine.

7.1.2 Internal clock

This clock source is the crystal clock source in ERM-MUX/PLUS.

7.1.3 I/O card clock

I/O card clock is provided by CH1 data port of specified SLOT-n. The IO cards that support such functions include: N64K/V35 card, A/SYNC-128K card, SUB-E1 card, and G703-64K cards.

7.1.4 G703 external clock

The external clock source (Network Clock) will be connected to the BNC socket or RJ-45 connector (PIN4/PIN5) on back card for external clock, and so the G.703 external clock is the system source.

7.2 Connection between multiplexer and synchronous terminal device

In the following examples, the clock setting methods are described.

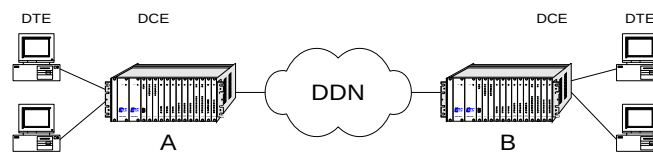


Figure 7.1 The direct connection between multiplexer and synchronization terminal device

Both of MUX/PLUS A and B can adopt recovery clock, or one recovery clock and other internal clock. All terminal devices can use RC and TC timing. Terminal device and MUX/PLUS are connected via straight cable.

7.3 MUX with synchronization tail circuit

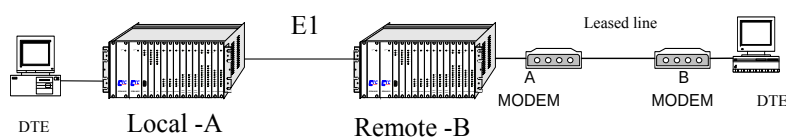


Figure 7.2 MUX/PLUS with synchronization tail circuit

The E1 clock of MUX/PLUS A is set with internal clock and MUX/PLUS B adopts recovery clock. The clock for MODEM A is set as external clock (receiving timing from data port) and the clock for MODEM B is set as the loop clock. MODEM A and MUX/PLUS B are connected via cross-over cable (DCE to DCE), and all other interface cable for terminals are straight (DCE to DTE).

Chapter 8 Application Notes

8.1 Connection between MUX and public network devices

For this type of connection, various businesses can be connected to remote places via ERM-MUX/PLUS cross connection, and many kinds of media can be used, such as DDN network, PDH, SDH, PCM, digital microwave, and so on. The ERM-MUX/PLUS can also be used for local connections.



Fig. 8.1 Point to Point Media

8.2 Connection with program controlled exchanger

One E1 channel is used for the connection of program controlled exchanger (PBX), and other E1s are used for connecting with public networks.



Fig. 8.2 Connecting public networks and PBX

8.3 Data connection among multiple points

In the figure 8.3, user data No.1 to No.6 can be in one time-slot or a group of time-slots. The network in figure 8.3 shows: User data 1 is transmitted from Site A to B. user data 2 transmitted from Site A to Site C. user data 3 transmitted from Site A to Site D. user data 4 transmitted from Site B to Site C. user data 5 transmitted from Site B to Site D. user data 6 transmitted from Site C to Site D. You can make up the required data transmission system flexibly by using E1 channels. Additionally, the E1 clock at Site A is set for internal clock, while the main clocks for Site B/C/D should be set for recovery clock.

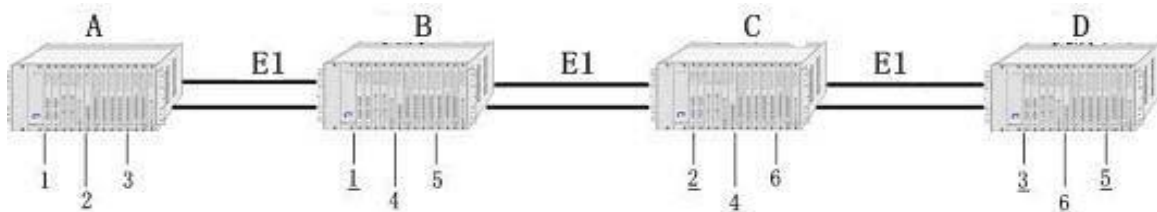


Fig. 8.3 Drop and Insert Method

8.4 The extension and expansion of Data Distribution Network

Use E1 card connections to converge users from Site B/C/D into one E1 channel. Connect them to DDN in centralized way, please refer to figure 8.4.

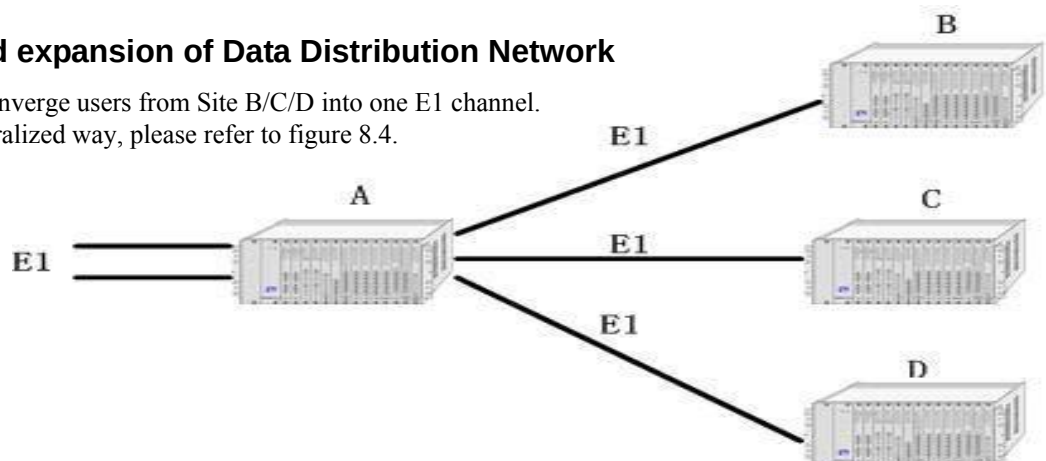


Fig 8.4 Point to Multi-point

8.5 Implementation of multiplexing connection for voice/signaling

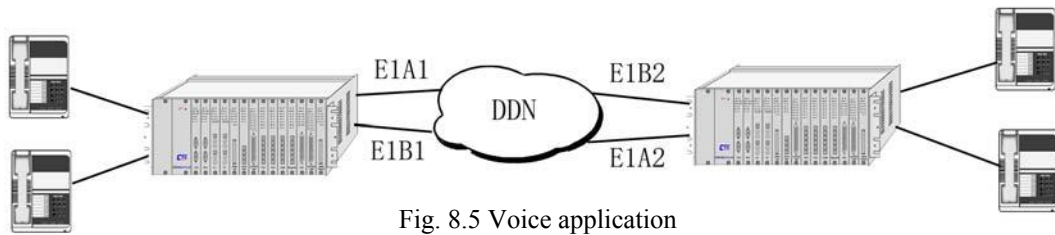


Fig. 8.5 Voice application

In the figure 8.5:

1. Connect telephone to ERM-MUX/PLUS via FXS card, and multiplex it to a time-slot of E1A1 and E1B1.
2. Connect the telephone of opposite side to ERM-MUX/PLUS via FXS card, and multiplex it to corresponding time-slot of E1A2 and E1B2.
3. For E1 circuits of both sides, E1A1 is connected to E1B1, and E1B2 is connected to E1A2. A makes communication with A*, and B makes communication with B*.

8.6 Typical application of G703-64K card

In the figure 8.6 Signal from G703-64K card is sent to opposite side via E1 line, and then sent to ERM-MUX/PLUS from the opposite side by using E1 line. Users can be connected using ERM-MUX/PLUS.



Figure 8.6 G.703/64K Application

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www.ctcu.com

T +886-2 2659-1021 **F** +886-2 2659-0237 **E** info@ctcu.com



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